

The AUTOMOBILE



How Scientific Design and Use of Aluminum Alloys Will Cheapen Motoring

By A. Ludlow Clayden

THE automobile of 1918 ought to be 30 per cent lighter than the automobile of 1916.

Correspondingly it ought to be anything from 20 to 40 per cent cheaper to run, but it may cost a little more to buy. Surely, however, a matter of a few hundred dollars ought not to be considered if they are to be saved over and over again in the first year's use of the car.

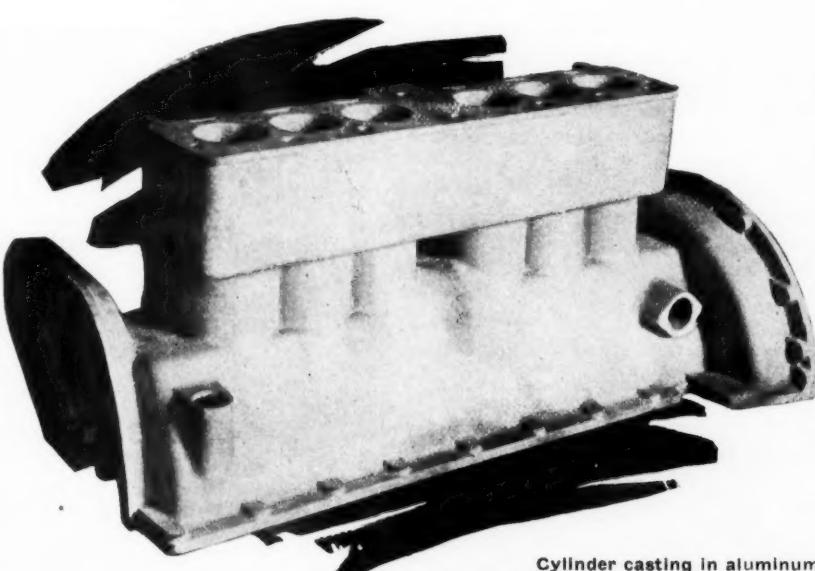
Weight which is not doing work is *dead weight* and there is no place for anything but live parts in an automobile. Dead weight cannot ever be cut out entirely, but in most cars there is a great mass of needless metal of which the only effect is to eat up tires and gasoline. We know now the sort of road performance expected of the modern automobile and we cannot look for anything greater

in the way of ability than is given by a good six, eight or twelve, but we could get the same ability with much less weight and so be able to utilize it for much less money. Engineers have worked for twelve years upon little else besides the motor so would it not be reasonable to turn to a new problem for a while and apply the same brain effort to improving the whole of the chassis?

How to Reduce Weight

There are two ways of reducing the weight of a car. One is to dispose the material more scientifically. The other is to use much more aluminum alloy of one sort or another.

In the following it is purposed to give attention principally to the latter possibility, using more aluminum and to show how much more extensively aluminum could be used with



Cylinder casting in aluminum as it goes to the machine shop.
This is for a valve in head motor. Some thirty castings something like this are in service in the hands of private owners throughout the country



Everyday aluminum pieces. A plain and a water-jacketed intake manifold

nothing but advantage. To cut the weight by using light metal means thinking of ounces here and odd pounds there, it means that with every detail of a chassis we must consider how light it can be made, taking nothing for granted from past experience. But before going into detail a few words on the history of aluminum in the automobile may be said.

Aluminum Returns from Obscurity

Aluminum was such a weak metal when automobile engineers first began to use it that it had to be extremely massive in order to obtain the necessary strength. Thus we found frequent claims that a crankcase, for example, could be made just as light of cast iron; with the gearbox it was not possible to house bearings directly in the aluminum, because the soft metal would gradually sink away and leave the ball race loose and rattling, and it was not safe to use aluminum for the middle part of a rear axle, as it was liable to bend out of shape and then crack. Also aluminum cost a good deal of money so altogether it was not a very encouraging material ten years ago.

Then came a slow change as founders discovered how to alloy the light metal with copper, zinc and other substances, but the engineers who had turned to the use of iron and steel for parts once made of aluminum were satisfied with what they had done and did not feel inclined to give aluminum another chance.

This brought us to the stage where the unit power plant appeared and this weighed altogether too much if the base was anything except aluminum, so engineers then discovered what a vastly different sort of metal aluminum had become. To-day it is almost as strong as cast iron and can be stronger. It has a high power of resistance to shock, can be cast very accurately, machines more easily than any other metal and its quality is regular while its quantity is infinite.

There is practically no *cast* portion of an automobile which cannot be made of aluminum with utterly satisfactory results both in the shops and on the road, and we may soon see some forged parts replaced by the lighter metal.

Aluminum Cylinders to Be Used

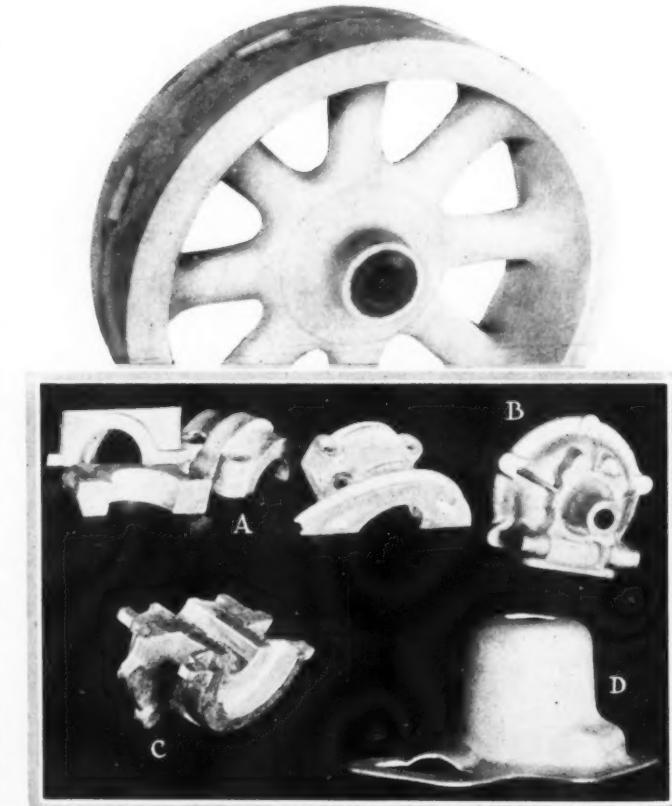
Having said that there is no casting in an automobile chassis that cannot be made of aluminum let us begin with the cylinders, the largest cast part and the one which seems the least susceptible of aluminizing. Next year there will be several cars in regular use with cylinders of aluminum and one of the biggest motor builders actually sent out a dozen or more motors this spring with cylinders of this metal, painting them so that the fact was hidden to the buyer. The results have been so satisfactory that more than one prominent engineer is preparing to start in with aluminum cylinders as standard.

Here let it be explained that there are two parts of the cylinder which cannot be aluminum, the valve seats and the wall against which the piston works. In the motors already made up a very thin iron liner has been used to make the piston working surface, and a little iron plate is cast in to form the valve seatings. The cylinder liner is as thin as the machine shop can make it, as thin or thinner than a sleeve of a Knight motor, and there is even a possibility that it *may* be found possible to run the piston in a cylinder of unlined aluminum. This is a matter of experiment, calling for investigation with different alloys, but even with the compound construction the weight of the iron is very little indeed.

The aluminum cylinder block can be cast with walls of exactly the same thickness as would be used for cast iron, because an iron cylinder's dimensions are determined by the limit of thinness to which a foundry can work and not by considerations of strength, so the weight saved is directly in proportion as the weights of aluminum and cast iron.

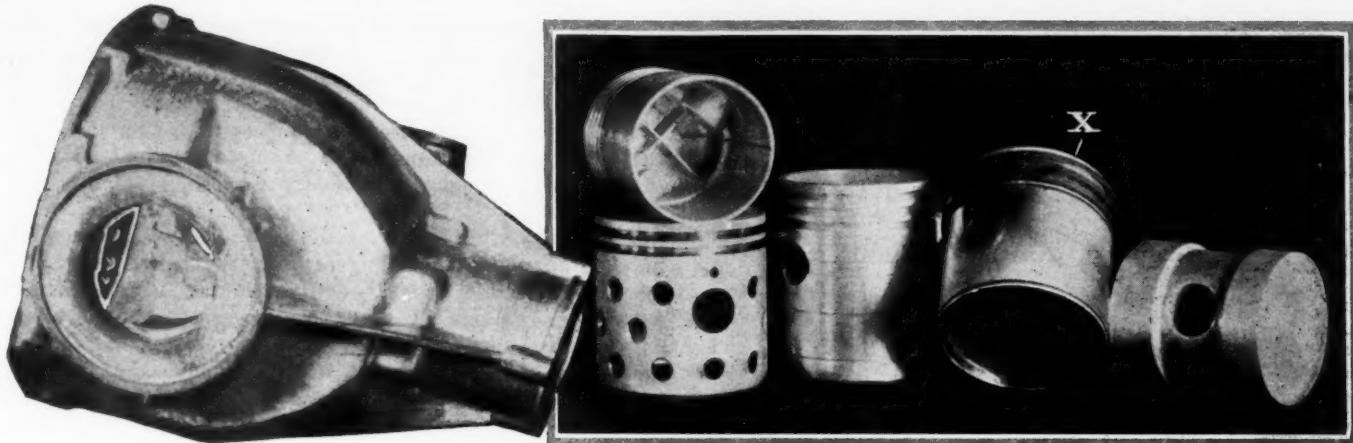
As an example let us take a six-cylinder block casting for a 3 by 5 motor. One of good design by actual test, weighed 119 lb. and as the ratio of weights is between 2.5 and 3 to 1 the saving in weight by using aluminum would be 72 lb. at least.

There is another advantage too, which is often forgotten in thinking of aluminum pistons, and this is the much better heat conducting power of aluminum. Heat conductivity is often measured by taking that of silver as 100. On this basis iron has a conductivity of 11.6 and aluminum 31.3 which means that heat flows through aluminum nearly three times more easily than it does through cast iron. The effect of this is that aluminum pistons and cylinders part with their heat to the cooling water much more quickly. In a motor that is running, the piston and the inside cylinder wall are



Above—A sand cast aluminum truck wheel. Many of these are in use and are said to save as much as 1000 lbs. on the whole weight of the vehicle

Below—A—Permanent mold bearing caps. B—Permanent mold pump casing. C—Sand cast cover showing how thin sand casting can be done. D—Sand cast bearing cap which compared with those from the molds shows the machining saved by the latter process



Left—An elaborate permanent mold job. A differential casing which needs hardly any machining. Right—Pistons cast by the permanent mold process. That marked X ran for 490 consecutive hours at 1300 r.p.m., equivalent to 17,000 miles on the road at 35 m.p.h.

a good deal hotter than the water in the jackets and with aluminum cylinders there is still a temperature difference, but it is not so great. Now, as it is the temperature of the piston and cylinders which controls that of the valves, and also influences the efficiency of the lubrication, it follows that the aluminum motor will run cooler at high speed than the iron engine. This is what might be called an accidental advantage, for the weight saving is the really important thing, but it is an added reason for using the better material.

200 Pounds Saved

Several good engineers have been drawn to the extended use of cast iron, because a cylinder block which has the top part of the crankcase integral with it gives a very rigid support to the crankshaft. Now, just the same rigidity can be had with aluminum cylinders and crankcase in one integral piece and the weight saved, as compared with integral cast iron would be probably 200 lb. or more on a 3 by 5 six-cylinder motor. On an eight it would be almost as great proportionally and similarly on a twelve.

The little Sterling motor, illustrated by a sectional drawing, is said to weigh nearly 100 lb. less than the standard model. Not only is this immense saving an advantage when the car is completed and tire wear or gasoline consumption come to be considered, but it makes a perceptible difference in the cost of freight on the rough castings, and still more in the machine shops. A six-cylinder block which can only be handled with great difficulty by three men becomes light enough for two to play with or for one to carry a short distance, and in a big production shop this would cut the labor cost by an appreciable amount as well as speed up the handling. Also, apart from handling, the machining of the aluminum is a vastly quicker job than with cast iron.

So there is plenty to be said in favor of aluminum on the cost side, which goes to offset the slightly greater expense of the casting in the first instance. No doubt aluminum cylinders would cost more than iron at the present time, but there is no reason why they could not become as cheap if a large plant was organized on an aluminum basis.

With connecting rods the experimental stage has not yet been advanced very far. Two kinds are possible, those made up from pressings of sheet metal welded together,

and those cast or die-cast. The former have been tried out in one or two aeroplane motors with success and the latter have been tried in some small cycle motors, also with encouraging results. It remains for the future to show whether the metal is easily applicable to ordinary automobile work but there seems no fundamental reason against its ultimate success.

Untried Possibilities Numerous

In a motor the crankshaft, camshaft, tappets, valve seats, cylinder liners and distribution gears must be iron or steel.

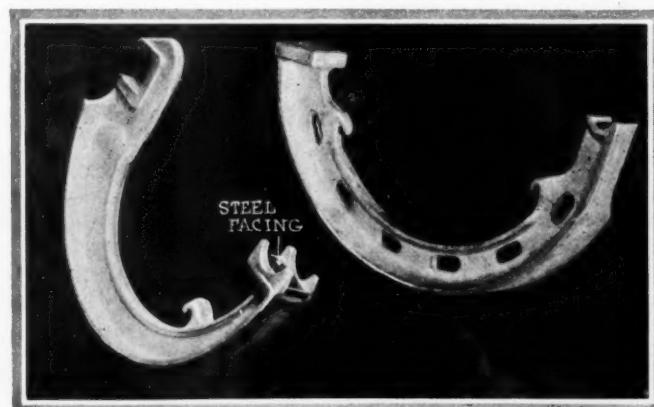
Crankcase, cylinder block, pistons, connecting rods, pumps water header and carburetor, intake manifold, piping and the metal parts of ignition apparatus can be aluminum.

This is speaking broadly, for aluminum could easily be compounded with the steel parts in several instances. Take the timing gears for example, or the sprockets, if chain distribution is employed. There is no reason why these should not consist of aluminum centers having a steel rim on which the teeth are cut. Compound casting could produce such a wheel, and it would not be difficult to devise a method of attaching a steel ring to an aluminum blank by other means. It may even be possible before long to make a die casting wherein a finished ring gear of steel is filled with a ribbed aluminum center and turned out of the mold ready to go on the shaft. Of course, it sounds as though going to an extreme of this sort would be absurd, but the saving in weight might easily be 5 or 6 lb. or even more and it is by detail cuts of this sort that the total chassis weight must be reduced in the future.

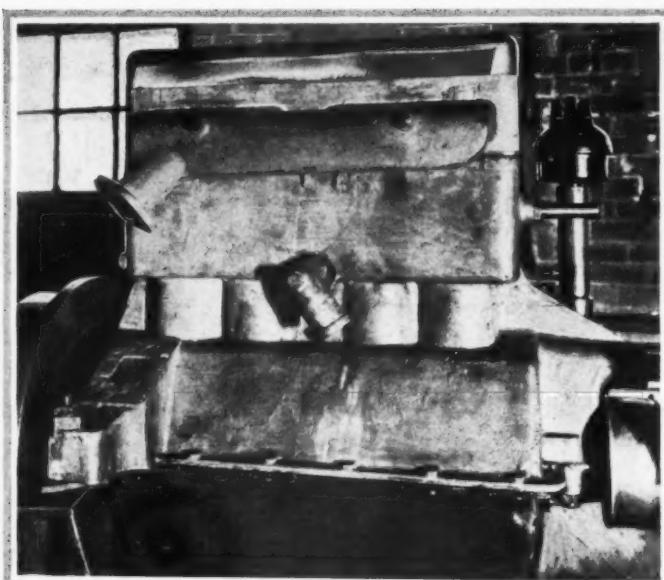
As another instance take the steel parts of a leather ring or other form of coupling used to drive a generator or a magneto, for these are designed for convenience and not for

strength and might just as well be aluminum. Probably, allowing for the saving in machining cost, they would come out actually cheaper.

Other parts which might advantageously be of aluminum are such things as starter brackets, the small levers used in the control mechanism, fan, fan bracket and fan driving pulley, all cover plates, breather or oil filler caps. Other details will suggest themselves as soon as this line of thought is followed and it is a conservative estimate that a motor with aluminum used to



Two aluminum brake shoes. The part indicated on the left one is a bit of steel cast in to take the cam wear



An aluminum Sterling motor which has been running for weeks on the block in the manufacturer's plant. This motor is 100 lb. lighter than the cast iron equivalent and keeps much cooler. It is expected that a large number of aluminum Sterling engines will be used next year.

the practical limit would weigh little more than 50 per cent as much as a similar motor with much cast iron in its make up.

Attention may be drawn to the undoubted fact that the die cast, or permanent mold, aluminum piston is far past the experimental stage and it is within measurable distance of being as cheap as cast iron, while being much cheaper than steel. Its lesser weight reduces the total weight of the motor, the vibration stresses and the wear on bearings, while its better conductivity causes it to keep cooler and so allows a higher piston speed without ill effects. In a year from now or even less, it will be possible to say the same of aluminum cylinders, save that their use does not affect vibration or bearing stresses.

With the small, and less important parts, the designer who is seeking to save weight should consider each piece to make up his mind whether it would be strong enough in aluminum. On most good motors there are many pounds of steel and brass parts which would do their work just as well whatever they were made of, and when we get a piece like this it ought to be aluminum.

Let it not be forgotten either, that aluminum exists in sheet as well as in ingots and that its great ductility enables it to be pressed or spun into elaborate shapes. For strength it can be corrugated or ribbed and the necessary dies for making parts of simple contour can be prepared from cheap castings.

No mention has been made of the exhaust manifold but this is a part which must be of some material capable of withstanding high temperature long continued. Aluminum deteriorates slowly if used for the exhaust branch, unless it is water cooled, and if it is jacketed the extra weight of the larger amount of water necessary in the system would more than counterbalance the saving on the part itself.

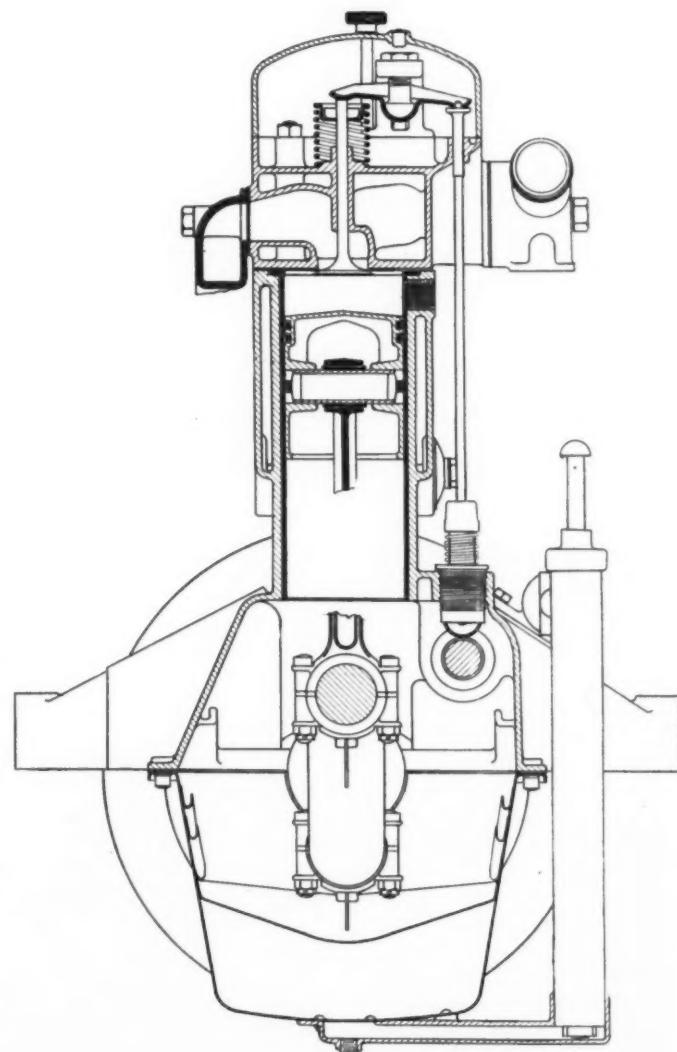
Small Parts in Transmission

Now coming to the clutch if it is a cone type we can obtain the lightest center by using aluminum, and if it is a plate pattern with fabric facing there is a possibility of using aluminum to carry the fabric. Probably the clutch is one of the parts least susceptible to the introduction of light metal, and it is certainly the part where weight matters least, as it all goes to make up flywheel mass which is controlled by the needs of the motor. We must have enough weight here in any

case and cannot cut it out. Almost the only opportunity for introducing aluminum in the clutch operating gear appears to be the foot plate of the pedal. Pedals in which the foot plate is a separate part adjustable to suit drivers of different stature are becoming increasingly popular, and there is no possible objection to the use of a light alloy for the actual pedal, though it could not be employed for lever parts.

Transmission, in so far as the gearbox is concerned, can have an aluminum case for practically the same cost as cast iron, and, of course, it usually does so. Neither shafts nor gears could be anything but steel, and the shifting mechanism must be steel also. There should be no need for brass parts. Aluminum can be employed for the quadrant, if such is used, or for the spherical housing for the foot of the gear shift lever. The levers themselves for gears or emergency brake can be lightest if of steel, but they are almost always needlessly heavy. Some most excellent and very light levers have been made from drawn steel tube with aluminum handles and drop forged lower end brazed in. No doubt they cost more than the plain type, but there is a chance of dispensing with several pounds on these two levers.

Where pressed parts are used, such as cover plates, protecting shields for the quadrant and so on, they are better of sheet metal than castings as a rule, but they might be



Section of the Sterling aluminum motor. The black parts show the iron which remains. The liner is pressed in and is previously turned up, the bore being ground after assembling in the aluminum. To make the valve seats a thin steel plate is used, also shown in black section. The connecting-rod has been cut and the upper half turned round to show the section of the Lynite piston.

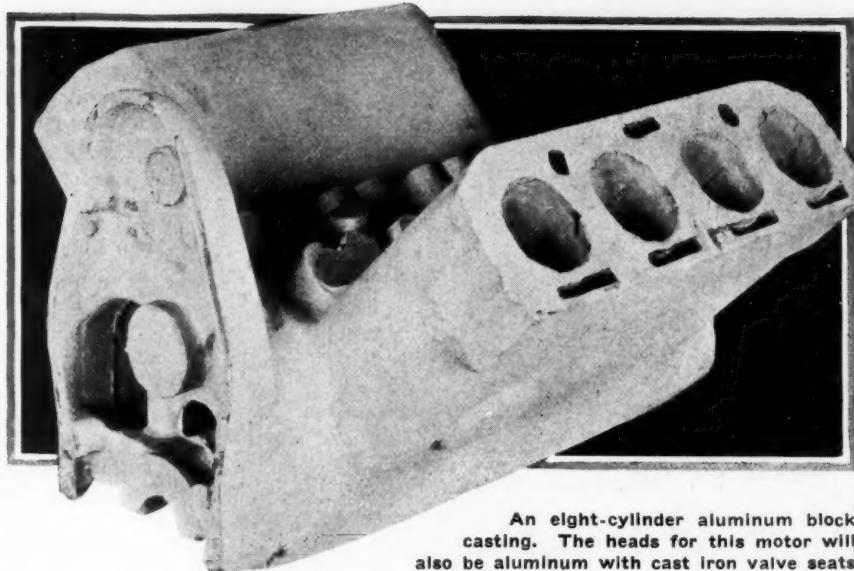
pressed aluminum just as easily as pressed steel and with very little extra cost. Another use for sheet aluminum where it effects a great saving is in the bonnet, and to show how great is the difference between steel and the lighter material, it may be mentioned that a Ford hood in aluminum weighs just 16 lb. less than the same thing in sheet steel.

Cutting Unsprung Weight

After much argument there seems now to be agreement that light axle weight is an advantage from every viewpoint. Obviously the front axle can be made lightest by using the strongest possible material—steel, but this hardly applies to the rear axle. Here we have both strength and accommodation to consider, and the actual axle sleeves must be either steel or reinforced with steel. No other material will withstand the violent shocks for long. Of course, it is possible to make the driving shafts take the whole weight, as was done many years ago, but this calls for very massive shafts. Apart from the sleeves of the axle, however, there is no need for immense strength, and the center part of an axle is designed more to contain the differential and bevels than to act as a bridge between the two sleeves. Of course, it must have strength enough to serve this latter purpose, but the job is well within the power of aluminum, as has been shown by its successful use at this point on many different cars.

This is a debatable point, of course, and many engineers prefer to have a single steel member, either pressing or forging, extending from wheel to wheel without any separate center case. When this style of axle is used the actual differential container is already frequently aluminum as it should be, together with cover plates, etc. An unusual application of aluminum to axle parts has been tried out lately by one of the big axle manufacturers, this being the use of aluminum, permanent mold castings for the shoes of the internal brakes. It is advantageous to have a good rigid support behind the brake facing or asbestos material, and this is given very readily by the aluminum shoe. To provide a working surface for the spreading cam a small piece of steel, already machined, is embodied in the casting and the shoe needs no machining save the drilling of holes for the facing attachment rivets.

On road wheels the hub caps can be aluminum, or very light pressings in brass or steel, and do their work just as well as the all too common heavy brass casting. The wheels themselves are so very delicate a subject that the writer will leave them out of the discussion save for the remark that demountable rims are commonly heavier than the demands of strength necessitate. It is not easy to see how a light metal



An eight-cylinder aluminum block casting. The heads for this motor will also be aluminum with cast iron valve seats

could be used at all widely in their construction, but weight can be saved by simplicity of design.

Reducing the Odd Ounces

So far the main units of the chassis have been touched upon and the details left, but, though the big savings of weight will be found in the main parts like the motor, there are many small things on a car which weigh hundreds of pounds altogether.

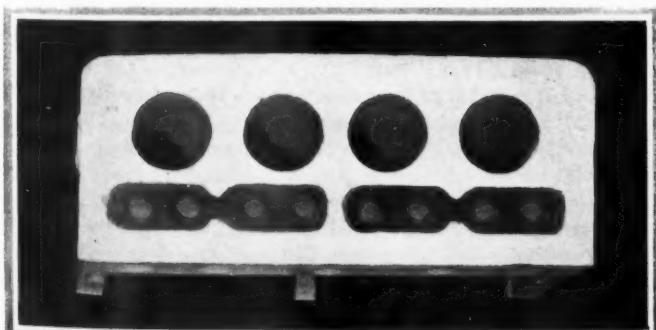
Let us start with saying that except for the radiator and bearing bushings there is no excuse for the use of brass anywhere. Take the radiator cap, for example, and consider a neat design where the cap is a brass casting secured by a quick detachment clip; substituting aluminum would cut out perhaps 6 or 8 ounces.

Again, take all the greasers and lubricators; at present these are not, so far as the writer is aware, made in any material but brass; yet why should they be so heavy? All the greasers on a chassis must total to a very substantial number of pounds, and brass weighs more than three times as much as aluminum. What about door handles, switches, control levers, tool box hinges, top fittings and windshield parts?

Then, turning to the body proper, this can be lighter if aluminum is used for the panels, and strength with lightness are combined to a wonderful degree if the whole body is cast. Still if the more usual system is followed it seems reasonable to suppose that much weight could be saved by substituting aluminum castings for some of the concealed parts of the body. Here we normally have heavy ash strapped and bracketed together with iron plates and forgings, and the same strength could be had from aluminum castings with a great weight saving. It would certainly cost more, but so do all novelties till they are brought down to a manufacturing basis.

Better Use of Steel Possible

It would be possible to elaborate this argument for many pages more, but enough has been said to direct attention to the possibilities for weight saving by the substitution of aluminum for other metals. In this way alone it is likely that a 4000-lb. car could be cut down to 3000 or even less, and there is still the chance of further saving by alteration of design to make better use of the steel where steel is the only choice. How we can cut weight in frame and fenders has been suggested in the paper read by A. P. Brush before the Detroit section of the S. A. E. last May, and one might add that a propeller shaft brake is lighter than two brakes on the rear wheels, a Hotchkiss drive is lighter than any other layout,



View of a cylinder head with small pieces of cast iron cast in place to form the valve seatings



Sundry small pieces of aluminum which all help to cut the weight

Chasing Aeroplanes with 5-Ton Trucks

PARIS, July 18—Chasing aeroplanes with an American 5-ton truck is a job which delights the hearts of the lads of the Royal Navy operating from the Belgian coastline to bombarded Arras. Early in the present year the British authorities took delivery of a fleet of Pierce-Arrow 5-ton trucks—stock chassis without a bolt or a nut differing from those delivered to clients in America. When they reached England a number of the trucks were fitted with special chrome-nickel steel bodies, the plates being $5/16$ in. thick, and each truck received a powerful high-angle anti-aircraft gun. The load was more than the trucks were theoretically designed to carry, being well over $6\frac{1}{2}$ tons, and the recoil of the gun is equivalent to a couple of tons, but this has not prevented them from giving every satisfaction.

Half of Brigade Armored

The first half of the Pierce anti-aircraft brigade has been in active service in France and Belgium for four months. There are eighty-five trucks in the brigade, half of them being armor-plated and carrying a heavy gun, and the remainder having an ordinary body. Since they came across the Channel the trucks have been in service every day and have already accounted for the total destruction of six aeroplanes. After four months' service there has been no trouble in the axles or chassis and not a spring shackle or clip has loosened. This statement is only of value when consideration is taken of the conditions under which the trucks have to work. Unlike the ordinary convoys, these armored trucks have to operate right up to the firing line, many of the journeys being made at night, when not a glimmer of light can be shown for fear of attracting the enemy's fire, and over roads where the artillery had pounded great shell holes, or while the roads were actually being shelled.

Near Hill 60

This brigade got out in time for the great German attack at the end of April and early May, when asphyxiating gas was used for the first time, and the French line was pierced, putting the English and Canadians in a very perilous position. Staff-Sergt. Granville Pollock, an American who vol-

unteered to serve with the English on the Pierce armored car brigade, has supplied a few particulars of the work done by this brigade in that great battle. One of the Pierce armored trucks was stationed by the side of the famous hill 60, near Zillebeck, and within 300 yd. of the first line German trenches. According to a recent statement in the English Parliament, this hill was practically blown out of existence during the great battle.

War Raises Price

The writer is indebted to The Aluminum Castings Co. for the photographs which have been used for illustration. Most of the aluminum cylinders in use have been cast at the Detroit plant of this company, while the permanent mold work is done chiefly at Buffalo. The Detroit foundry is preparing for a considerable demand for aluminum cylinders and the Buffalo plant is daily increasing its facilities for piston production, the demand for this part having grown at a very great rate. It is unfortunate that one of the effects of the war should have been greatly to increase the price of raw aluminum so that all aluminum parts are now much more costly than they will be when conditions return to normal. Just now the producers of aluminum have their electric furnaces taken to the limit and are still quite unable to cope with the demand; none the less it is expected in many quarters that a drop of 30 per cent may be looked for within a year, and if the prophecy proves to be true the use of aluminum in automobile work will receive much encouragement.

Asphyxiating Gas and Carbureters

"In order to reach the car," relates Pollock, "we had to make a night trip along the communication trenches as far as possible, then crawl across country lying as if dead whenever illuminating fuses were sent up. The air was so heavy with asphyxiating gases that respirators had to be used most of the time. The driver and gunners of the armored car were found to be in good spirits and resolved to hold the ground and pound the enemy, which they did with deadly effect. Owing to the amount of gas in the air, it was feared that the carbureter might be affected, so every quarter of an hour the motor was started up and allowed to run for a few seconds. In every case a start could be made on the switch. Some of the cars have interesting souvenirs stuck in them: bits of shell and driving bands of copper around the spokes and rims where the 'whiz-bangs' have landed after bursting; some of them have big dents from large lumps of common shell, and one truck has a huge hole as the result of a direct hit. Nevertheless, every truck that came out is still on active service and going strong."

Granville Pollock, who has had war experience in Mexico, and aviation experience in America, slipped across the Atlantic last December with the intention of getting into the aeroplane corps. The Royal Marine Artillery was then forming its anti-aircraft brigade with the Pierce trucks and Pollock was offered the rank of staff-sergeant. He accepted, donned the blue uniform of the British marines, helped to prepare the first batch of armored trucks in England, came across with them, and has been living to the sound of guns ever since.



Passenger cars and commercial cars doing their share of the work at the National Guard Encampment at Hopewell Junction, N. Y.

U. S. Army Needs Motor Transports

Few Trucks at National Guard Encampment Do Excellent Work in Handling Supplies for Commissary Department

By J. Edward Schipper

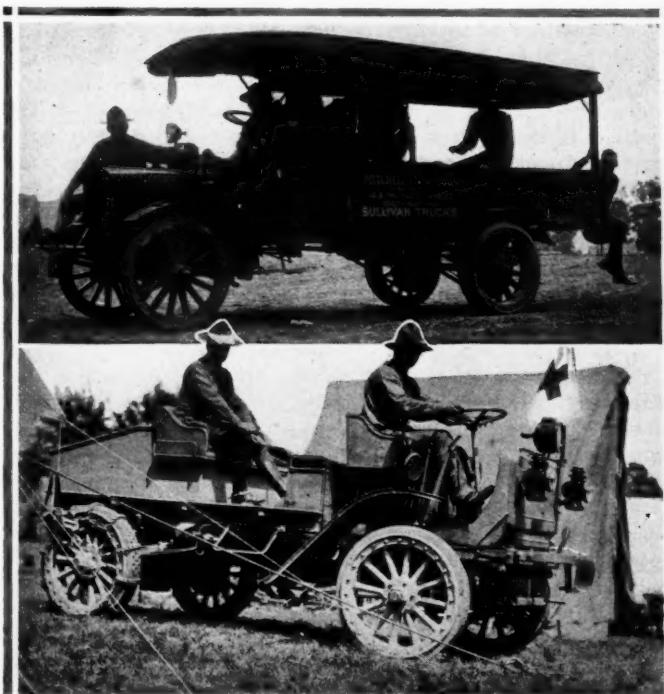
WITH the business of war engaging the attention of almost half the population of the earth, it is but natural that the eyes of the people of the United States turn with interest on the military forces of their own country. We are only emerging from the first feeling of stunned surprise which swept over the whole country when the vastness of the scale on which the conflict is waged in Europe struck us with the force of a blow. For years talk of the military preparedness of the great European countries was known to every schoolboy in the country, and yet, when the enormous war machinery was taken from its warehouses and put to the business for which it is intended it could not but cause a feeling akin to dismay in a country in which the war trade is not even a secondary consideration.

Our strength is the National Guard. That is the expression with which thousands of citizens dismiss the idea that this country would not be able to face in conflict one which has made a study of war for generations. This being the case, it is but natural that the efficiency of the militia becomes of intense interest to the citizenship of the country at large. We have three lines of defense. A small regular army, which is at best but a nucleus; the National Guard, which must in time of war, or at least for the first year or two, be the backbone of our forces, and the volunteers.

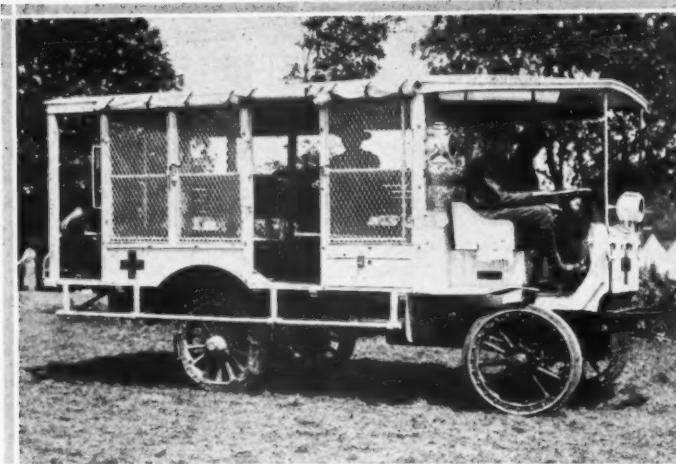
Gasoline in War

An armed crowd is not an army. An army to be efficient must be well officered and trained, and by arms is not meant guns and ammunition alone, but the thousands of other details which go to make up the equipment of a mobile force. It has been said in Europe that this is a war of gasoline, and in the early stages of the combat where the world was electrified with the stories of quick movements of thousands of troops, this undoubtedly was true. It was gasoline which carried the German armies across Belgium. It was gasoline which carried the French army out of the gates of Paris to oppose the invader and drive him back from the capital of France. It is gasoline wherever quick mobilization becomes neces-

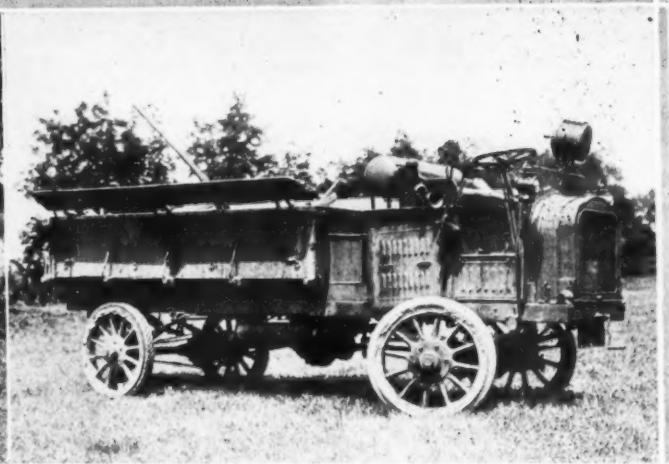
sary. The transportation of heavy guns, of large quantities of ammunition, of machine guns, food, clothing and all the necessities of an army operating some distance from its base of supplies depends on gasoline and the machinery which it drives. Therefore, when talk of training more soldiers and of developing greater efficiency in the National Guard spreads from one border of the country to another, it is the gasoline-driven machinery which we must develop



Sullivan truck and Autocar officers' vehicle used at maneuvers at National Guard encampment at Hopewell Junction



Autocar ambulance similar to the type which went with the Canadian contingent to the front



Flareboard bodies on 1 1/2-ton chassis are most popular for all-around army use

along with all the other modern equipment if we wish to put ourselves on a par with other first-class powers.

Throughout the country in various states the National Guard organizations are holding their summer encampments and military maneuvers. Here men who spend the major part of the year in clerical or other sedentary pursuits are taken from their offices and put through the rigid exercises of a military encampment. This week or two of training per year is intended to put the men in touch with the development of military art and to accustom them to the elements of field work which it is not possible to bring out in the armory. It is here that the opportunity arises to demonstrate the advance made in the use of the accoutrements of warfare. It is now that some of the lessons which we learn from the conflict on the other side of the water should be absorbed and kept for future use.

New York Militia Maneuvers

During the last few weeks the army maneuvers of the New York State militia have been held at Camp Whitman, Hopewell Junction, N. Y. During the week of from July 10 to 17 approximately 5000 men were in this camp. These were made up of the Quartermaster's Corps, which acted as a central supply depot, and four regiments. The Seventh, Twelfth, Sixty-ninth and Seventy-first. In addition, there were three troops of cavalry, composed of a squad of the Second United States cavalry regulars and Squadron A; a hospital corps and four companies of regular infantry.

The work of this body of men is of particular interest, since the New York State militia make up an entire division in the army, and is supposed to be as efficient as any state militia in the country. The work of the officers and men individually can be dismissed as enough is said when it is stated that they are all members of crack organizations and can be relied upon to go through the manual of arms and field maneuvers with great éclat. In point of equipment, however, outside of a few machine guns and modern small arms, a wide chasm exists between what our men had and what would have been a part of the organization of one of the up-to-date foreign forces.

For the entire force of 5000 men but twelve motor trucks were supplied, and of these only five were owned by the organizations in camp. Four of the trucks were owned by the Quartermaster's Department and the fifth by the Seventh Regiment. The other trucks were merely loaned by companies for demonstration purposes or hired from civilian owners. A few of the officers brought their private passenger cars, but there was no organized arrangement of these. There were a few motorcycles used by the provost guard, but no motorcycle scouting corp was on hand. The



Some of the roads at the maneuvers resembled what might be expected in campaign work

camp kitchens were pulled by mules and horses, as were the camp equipment and supplies of the men. If the army had had to make a forced march of 48 hours across country it would have been at the mercy of the said mules and horses.

Motor Trucks Necessary

Of course this was merely a practice camp, the main purpose being to train the men, but there is no doubt but that we should go farther than this in our maneuvers if they are to be of value in bringing the citizen soldiery of the country up to a state of such preparedness that should war arise they would be able to take immediate advantage of the lessons to be learned from the fighting on the other side. When we learn that one of the belligerents has for the past year or two been arranging the motor trucks of one of the largest concerns so that at a moment's notice the bodies of peace times may be removed and guns and armor which had already been prepared fitted instead, we get a small inkling of the detail to which attention has been paid in fitting the mobile equipment for possible war times.

Although consisting of but 5000 men, the New York State militia did not have a sufficient number of trucks to handle

the situations which develop in camp. The trucks attached to the Quartermaster's Department were not sufficient to meet the requirements of bringing in provisions for the men and horses. Each regiment is allowed, by army regulations, four escort wagons. These are supposed to take care of the needs of the regiment. Generally, each of these wagons is hauled by four horses or four mules, and they have the advantage of being able to go through practically any kind of country. In the short-haul work between the last possible stretch of road for motor vehicle and a camping spot they are indispensable. In other words, they fill the gap between the motor truck and the pack mule.

Want Motor Equipment

Officers and men on every side stated their belief at the encampment in the value of a motor transport service. In fact, in view of what it has done in other countries, its value cannot be denied. The armored car, the motor camp kitchen, the scout car, the motor tractor for heavy guns, the motor-equipped wireless telegraph, field telephone, field observation post, searchlight service, ambulance service, medical supply service, ammunition supply and numerous other gasoline-driven vehicles are a matter of life and death to the fighting men of Europe. It is time that we, in training our soldiers, should teach them the use of these modern implements of warfare as much as we do the use of the machine gun, automatic revolver and developments in actual armament.

Of the four regiments in Camp Whitman only one, the Seventh, had motor trucks in addition to the four army transport wagons and sixteen horses. This regiment had five trucks, a 1½-ton White owned by the regiment, a 2-ton Pierce-Arrow and a 2-ton Mack hired from civilians at Newburgh, a 1½-ton Sullivan and a Morton tractor which were demon-

strated at the camp. The Morton tractor was tried out, hauling five of the regular army transport wagons at a time over all kinds of roads, and with its large steel-studded tires was able to secure good traction and made a favorable impression.

In the hospital corps there were three 2-ton Autocars on demonstration. One was a two-seated officers' car used by the chief surgeon, another an ambulance and the third a searchlight truck. The ambulance was of the same type as that furnished to the Canadian contingent which left for the scene of war last year. It has stretchers for six wounded and can carry six prone or eight sitting.

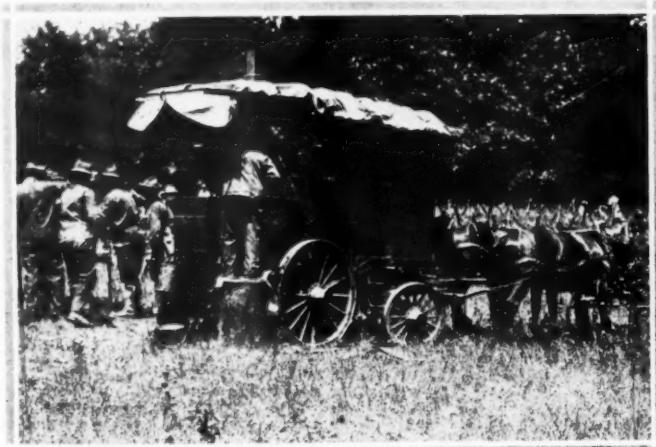
The Motor Searchlight

The searchlight truck is provided with a direct connected generator driven by a motor which is the same as that supplied for power purposes for the car. A hand cart carries two reels of wire, each $\frac{1}{4}$ mile long, permitting the searchlight to be wheeled a half-mile away from the source of power. In this way light can be played on the enemy from over the brow of a hill while the power plant is safely hidden beneath the shelter of the slope. The generator is operated at 110 volts, 45 amperes, and the lamps are of 5000 candle-power.

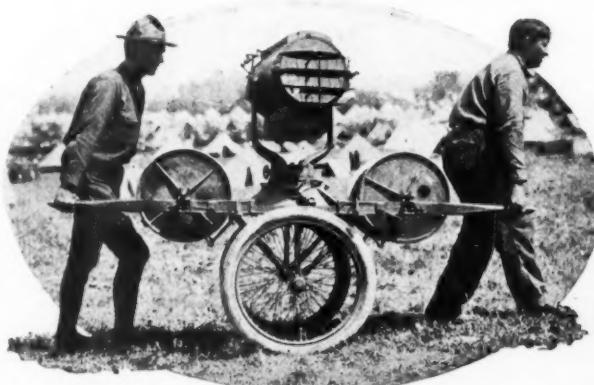
The searchlight truck and the ambulance were the only two bright spots which showed modernness or any tendency toward that state in the motor equipment. The 1½-ton Whites which were owned by the Quartermaster's Department and the Seventh Regiment have come to be old standbys and proved themselves to be of great use three years ago in the Connecticut maneuvers. Beyond this the motor equipment did not exist, unless the few motorcycles and privately owned touring cars which, it must be admitted, were of great utility, be included. The equipment which would enable the soldiers to practise moving large bodies of men over great distances was lacking, as was the motor-driven trench-digging apparatus and the various other up-to-date equipment which has come to be regarded as essential.

1½-Ton Truck Favored

Nowhere was anything heard against the use of motor-driven apparatus wherever it was possible to carry it. It is the consensus of opinion that the 1½-ton truck is the best all-around vehicle because it is fast and light, comparatively speaking. It does not become readily bogged, keeps up with the line of march readily, and can be converted to practically any use which the needs of the moment demand. The principal uses of the truck are in transporting supplies from the railroad base to the nearest accessible point to camp, and where large bodies of men are to be moved across country there is no doubt but that the use of motor vans, wherever the roads permit, would greatly increase mobility.



The camp kitchens were of the horse-drawn variety, these being handy for short marches



Searchlight apparatus on Autocar truck which can be hauled $\frac{1}{2}$ mile away from source of current



Connecting-Rod Design for V Motors

Advantages and Disadvantages of the Side-by-Side Construction and the Forked-End Rod—Why the Separate Arm Type Is Not Adopted—Movement of Rod Ends on Bushings

By Chester S. Ricker
Consulting Engineer

AT the February meeting of the Indiana Section of the Society of Automobile Engineers the question of connecting-rod design on eight-cylinder V motors was discussed. There were three types of motors mentioned: those with separate rods side by side on a common crankpin, those with a yoked-rod end on one side and a tanged end on the other rod which fitted inside of the yoke and took bearing on the yoke rod bushing; and lastly those in which a separate rod of shorter length was used and which bore against a special pin located on the side of the other rod.

The first of these constructions is exemplified in such eight-cylinder motors as are built by Herschell-Spillman and Buda companies. The second construction seems to be the most popular and is standard construction on Cadillac, Cole, King Ferro and Detroiter eights. The third form was used on the Schebler twelve-cylinder motor that was built about seven years ago.

The side-by-side construction has nothing against it practically but does have the disadvantage that it necessitates the offsetting of the two cylinder blocks so that the axes of the opposite cylinders will not pass through the same point on the crankshaft. This adds to the length of the motor slightly and does not make the motor absolutely symmetrical. It has the advantage that it permits the same adjustment of the rods after long usage just as one has on an ordinary motor of the vertical type.

The forked-end rods make for the shortest eight or twelve V-motor as the axes of the opposite cylinders are directly in line and the two connecting rods are likewise in the same line. The usual construction is to have the forked rod carry the bushing which runs on the crankpin. This bushing is in most cases made from a hard bronze and lined with an anti-friction metal. The rod from the opposite cylinder has a bearing on the outside of this bushing, frequently the former is case hardened steel and the latter hard bronze. The object has been to give this bearing the same kind of surfaces as have been found satisfactory on piston pin bearings. In the S.

A. E. meeting referred to one person stated that the movement of the connecting-rod end on this bearing was no more than on an ordinary piston pin. The purpose of this article is primarily to show just how much that movement really is on V motors and also to consider the reasons why the third type of connecting-rod has not been found satisfactory and has not been adopted on any of the most successful and up-to-date motors.

Piston-Pin Movement

It has not been customary to provide adjustment for piston pin bearings, although some manufacturers, notably Apperson, have done so for fifteen years. The question is, why have most manufacturers not done so? The connecting-rod

does not revolve on this bearing but merely oscillates and for this reason does not move either rapidly or to any great extent. That is why the wear on piston pins is so slow and why no adjustment is usually considered necessary.

The movement of the piston pin end of the connecting-rod with reference to the piston can easily be determined trigonometrically. It varies with the length of the connecting-rod and the stroke. If we express these variables as a single factor we can readily compute the total angle through which the upper end of the rod moves. The maximum angle B_p formed between the connecting-rod and the vertical or axis of the cylinder is determined immediately by the formula $\frac{R}{L} = \tan B_p$. The angle B_p has

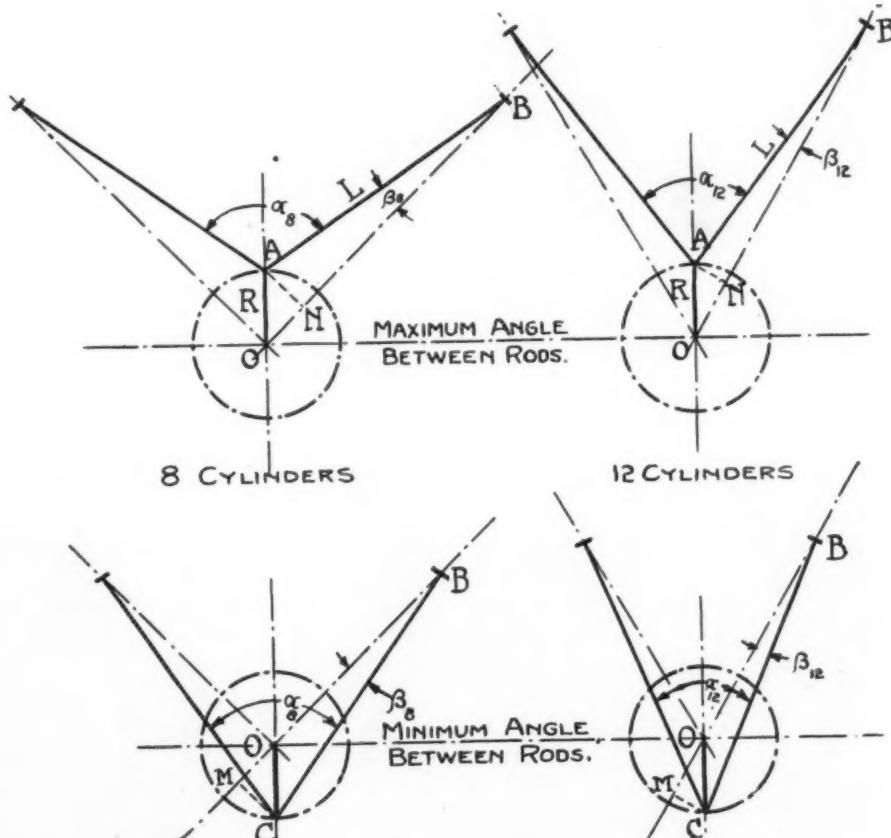


Fig. 1—Maximum and minimum angular positions between the connecting-rods in both eight and twelve-cylinder motors

been computed for several values of R in the appended table. The total or maximum movement of the rod end with respect to the piston is just twice B_p . This has also been computed and is found under $2B_p$. The values of R , which represents the crank length and L which is that of the connecting-rod are both transferred to an abstract quantity by using the ratio so motors of any size may be checked up from this table which is between the limits of 1:4 and 1:5. From this it will be seen that 28 deg. 6 min. is about the maximum angle in good practice and that it may be reduced to 22 deg. 36 min. if the connecting-rod is made long enough.

Movement of Rod Ends on V Motors

The computations made in these tables are not confined to the eight-cylinder motor but include data on twelve-cylinder motors with the cylinders at 60 deg. A number of such motors are on the road so that this information will not be amiss at this time.

In the accompanying diagram, Fig. 1, the maximum and minimum angular positions between the connecting-rods in both eight- and twelve-cylinder motors are shown. In the table which accompanies this article the maximum and minimum angles are not tabulated as

Angular Movement of Connecting-Rods Relative to One Another

$\frac{R}{L}$	.707 $\left(\frac{R}{L}\right)$	Eight cylinder		Twelve cylinder	
		β_s	$4\beta_s$	β_{12}	$4\beta_{12}$
.250	.1768	10° 11'	40° 44'	.1250	7° 11'
.245	.1732	9° 58'	39° 52'	.1225	7° 2'
.240	.1698	9° 46'	39° 4'	.1200	6° 54'
.235	.1660	9° 33'	38° 12'	.1175	6° 45'
.230	.1627	9° 22'	37° 28'	.1150	6° 36'
.225	.1590	9° 9'	36° 36'	.1125	6° 28'
.220	.1555	8° 57'	35° 48'	.1100	6° 18'
.215	.1520	8° 44'	34° 56'	.1075	6° 10'
.210	.1485	8° 32'	34° 8'	.1050	6° 1'
.205	.1450	8° 20'	33° 20'	.1025	5° 53'
.200	.1414	8° 8'	32° 32'	.1000	5° 45'

Angular Movement of Piston Pin End of Connecting-Rod

$\frac{R}{L}$	B_p	$2B_p$
.250	14° 3'	28° 6'
.245	13° 46'	27° 32'
.240	13° 30'	27° 0'
.235	13° 14'	26° 28'
.230	12° 57'	25° 54'
.225	12° 41'	25° 22'
.220	12° 24'	24° 48'
.215	12° 8'	24° 16'
.210	11° 51'	23° 42'
.205	11° 35'	23° 10'
.200	11° 18'	22° 36'

they do not have anything to do with the computation of the difference between the maximum and minimum angles. In the diagrams the angles B_s and B_{12} have been computed because it can be easily proved in the following tabulation that the difference in angles between the rods is equal to four times B_s or B_{12} . In the table it will be seen that maximum movement of the rods on an eight-cylinder

motor varies from 40 deg. 44 min. to 32 deg. 32 min. On the 60 deg. twelve-cylinder motor it is considerably less, varying from 28 deg. 44 min. to 23 deg. 0 min.

Computations

$$\frac{A - N}{R} = \sin 45^\circ. A - N = .707 R$$

Hence,

$$\sin B_s = .707 \left(\frac{R}{L} \right)$$

After computing B_s it is easy to find that

$$\alpha \text{ max.} = 90^\circ + 2B.$$

Similarly it may be proven that

$$\alpha \text{ min.} = 90^\circ - 2B.$$

The difference

$$\alpha \text{ max.} - \alpha \text{ min.} = 4B.$$

For the twelve-cylinder motor

$$\frac{A - N}{R} = \sin 30^\circ. A - N = .5R.$$

Hence

$$\sin B_{12} = .5 \left(\frac{R}{L} \right)$$

After computing B_{12} you find that α max. for twelve-cylinder motor will equal $60^\circ + 2B$, and similarly α min. = $60 - 2B$, making α max. - α min. = $4B$.

From the tables included it will be seen that the maximum movement of the rods on an eight-cylinder motor is between 44 and 45 per cent greater than that of the piston pin. On the twelve-cylinder motor this is much less varying from 2.5 to 1.75 per cent. Hence it is evident that the twelve-cylinder motor practically duplicates the piston pin bearing conditions at the big end of the forked rod.

Assembling the Forked Rods

One of the best-running motors of the eight-cylinder, forked-rod variety has the rods assembled in the following manner: Two of the forked rods are attached to the pistons in the first and fourth cylinders of the left hand block. The other two forked rods are attached to pistons in the two middle cylinders of the right cylinder block. In this manner the centrifugal effects upon the crankshaft and the balance of the motor is equalized, so it is claimed. This is the construction of the latest Northway

(Continued on page 237)

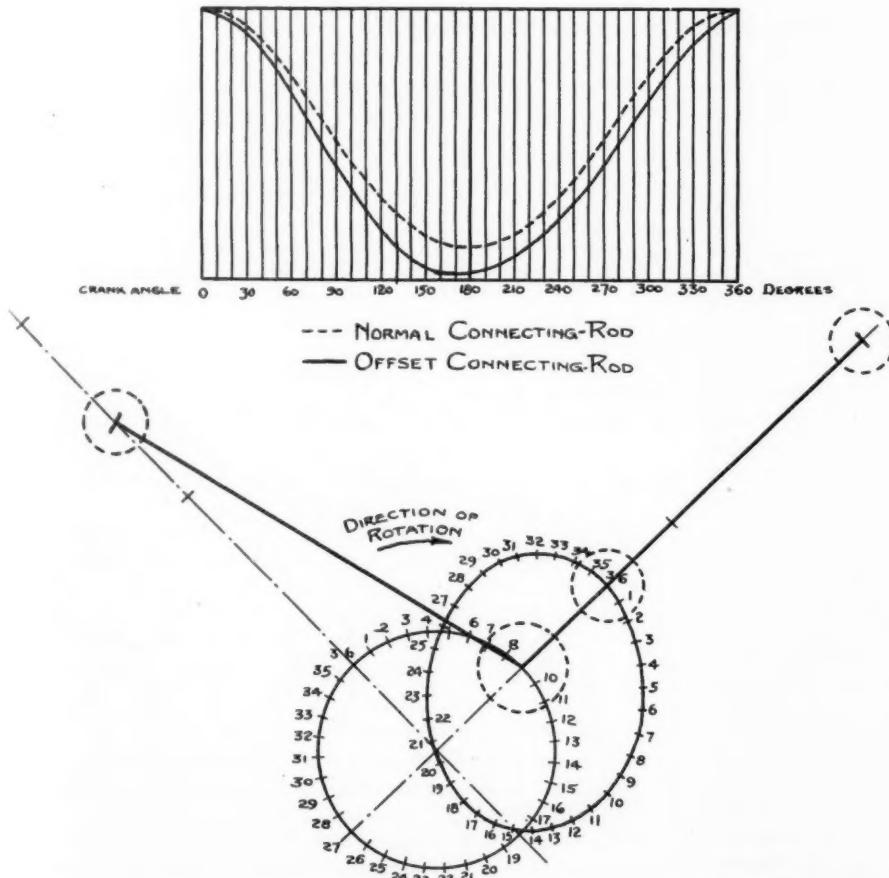


Fig. 2—Illustrating the various positions of the two cylinders at different points of the stroke. Note that the right-hand cylinder has a longer stroke than the left, besides differing in the general characteristics of its movement



Group of S. A. E. members in attendance at the meeting of the nomenclature division of the standards committee in Detroit

Standardizing Names of Parts

S. A. E. Starts Scheme for Universal Nomenclature— Will Save Time and Money in Replacement Work

IT has long been an ideal of the S. A. E. to determine a standard nomenclature for all the parts of an automobile so that confusion between the owner who wants the part, the dealer who has to fit it, and the manufacturer who supplies it may be avoided. At present the amount of time and money wasted every day by the difficulty of understanding what it is that the customer is writing about is immense, but to discover a way of cutting out redundant names has proved very much more difficult than anyone would imagine it could be.

Some Data Collected

The nomenclature committee has labored without producing any very tangible results, but the work done has been sufficient to demonstrate the great importance of the subject, and enough data have been collected to enable a fresh start to be made along a sounder line.

With this idea in view a meeting of sundry engineers and service men was called at Detroit last Friday, July 30, and the meeting was presented with a list of suggested names for a majority of the parts in a gasoline engine. Coming straight to detail these were taken item by item and the fitness of each term thrashed out. At the end of three hours the fifteen men present had agreed upon the names of some twenty simple parts only, and in one or two cases half an hour or more was occupied in the discussion of a single word.

Small Committee and Salaried Secretary Proposed

This sufficing to show the real practical difficulty of pleasing the ideas of everyone, Howard E. Coffin, vice-president Hudson Motor Car Co., proceeded to explain that the Society as represented by the Council thought the subject too difficult for handling by a committee. He pointed out the extremely small amount of progress made in a whole morning's

work and said that the new idea was to create a small committee and provide a competent, salaried secretary who would spend a year or two on nomenclature work exclusively, taking constant mail votes and calling upon the committee to an extent which the members would not feel made an excessive demand upon their time.

There is not an owner of an automobile, a dealer or a manufacturer who would not feel the benefit of a successful conclusion of this work, and the enthusiasm of the service men at this preliminary meeting showed in unmistakable terms what it will mean to them.

That the men present were representative of all classes of the industry and all types of chassis may be seen from the list following. Representing the S. A. E. were Howard E. Coffin, K. W. Zimmerschied, Coker F. Clarkson and A. C. Woodbury, who has collected the data which the meeting discussed by searching manufacturers' replacement parts lists. Representing the industry were: E. E. Sweet (Cadillac); H. W. Booth (Dodge Bros.); H. H. Barrows (Maxwell); H. W. Drew (Marmon); J. S. Smith (Moline); R. E. Marston (Packard); G. S. Mather (Paige); W. B. Stout (Scripps-Booth); E. J. Chase (Studebaker); E. W. Vultric (Hudson); C. W. McKinley (Overland); A. L. Clayden (*THE AUTOMOBILE*).

Half an Hour on One Subject

To give an example of the sort of difficulty which has to be overcome, one-half hour was spent without any very definite results in discussing what was a bearing and what was a bushing and what can be done with the nomenclature of bearing caps, carriers, housings, retainers, cages, etc. Water pipes and passages are another trouble, for there is an infinite variety. They may be top or bottom pipes, inlet or outlet manifolds, etc. Also a pipe which is an outlet from the cyl-

inder jacket is an inlet to the radiator, and vice versa, which gives a magnificent opportunity for confusion. The main idea in developing this works is to divide the whole car into groups and classify under a series of group headings. Below is given the suggested general divisions and part of the sub-division of Group 1, which shows the idea of the procedure which it is intended to follow; it must be understood that so far we are dealing with suggestions only, though it is safe to predict that another few months will show some real progress. The difficulty is a natural effect of the wonderfully rapid growth of the automobile industry and it is characteristic of that industry to get together and straighten out the tangle of terms which they have created individually.

GENERAL DIVISIONS

I. Power Plant	III. Running Gear
II. Transmission System	IV. Body
GENERAL DIVISION I—POWER PLANT	
A—Engine	F—Starting and Lighting System
B—Fuel System	G—Clutch
C—Ignition System	H—Accessories
D—Cooling System	
E—Lubrication System	
GENERAL DIVISION II—TRANSMISSION SYSTEM	
A—Transmission	B—Control
GENERAL DIVISION III—RUNNING GEAR	
A—Rear Axle	E—Springs
B—Front Axle	F—Steering Gear
C—Wheels	G—Muffler
D—Frame	

GENERAL DIVISION IV—BODY

A—Body	F—Tire Carriers
B—Top	G—Windshield
C—Hood	H—Lamps
D—Running Boards	J—Accessories
E—Fenders	

GENERAL DIVISION I—POWER PLANT

Sub-Division A—Engine

Group 1. Cylinder—Includes all parts usually assembled therewith, such as studs, valve caps, wire brackets, gaskets, water header.

Group 2. Crankcase—Includes all parts usually assembled therewith, such as studs, bearings, gaskets.

Group 3. Crankshaft—Includes all parts usually assembled therewith, such as timing gear, flywheel, oil connections.

Group 4. Camshaft—Includes all parts usually assembled therewith, such as timing gear, oil pump gear, pressure pump cam.

Group 5. Connecting-Rod and Piston—Includes all parts usually assembled therewith, such as bearings, shims, pin, rings.

Group 6. Valve—Includes valve-lifting mechanism above cam, tappet, spring, etc.

Group 7. Ignition Drive—Includes parts used to drive ignition devices, up to and including coupling.

Group 8. Auxiliary Drive—Includes parts used to drive electric lighting and starting system, tire pump, etc., up to and including coupling.

Group 9. Water Pump.

Group 10. Oil Pump.

Group 11. Starting Crank.

Group 12. Fan—Includes bracket, drive pulley, belt.

Group 13. Intake Manifold—Includes cylinder gaskets, nuts.

Group 14. Exhaust Manifold—Includes cylinder gaskets, nuts.

Group 15. Fuel Pressure Regulator.

Connecting-Rod Design for V-Motors

Methods of Timing Eight-Cylinder Motors

(Continued from page 235)

product in which experiments have been made with the forked rods all on one side. This has been found the most desirable combination.

Offset Connecting Rods

In order to illustrate the inherent disadvantage of the third type of V motor connecting-rod design the writer has drawn an accurate diagram, Fig. 2, showing the various positions of the pistons in the two cylinders at different points on the stroke. From this it will be clearly seen that the right hand piston which is attached to the short connecting-rod does not move in the same manner as does the normal piston. The locus of the lower end of the short connecting-rod is an ellipse instead of a true circle. As a result the piston movement in the right hand cylinder has an entirely different characteristic from that in the left-hand side, in fact it is not like that of any conventionally constructed motor. For example it reaches its lower dead center at about 160 deg. movement of the crank instead of 180. It has a considerably longer stroke than the left hand cylinder. This difference in characteristics should cause valve trouble unless a special camshaft were made and designed for this side of the motor. On account of the different timing necessary and the difference in stroke it probably will give a greater or less amount of power and so upset the balance of the motor. The rotational balance is probably very bad compared with either of the other types of con-

nnecting-rods so that we may expect to see much worse vibration from this type of motor than from the standard motors of any type.

Twelve-Cylinder Possibilities

As to the power obtained and the smoothness of operation that may be expected from the twelve there is little to be said. The eight is good enough in performance and if it were not for some other reasons, sales or mechanical, there ought to be no reason for the twelve-cylinder motor's existence. The writer was of that opinion until the other day when he saw a twelve-cylinder, 60-deg. motor with $2\frac{3}{4}$ by $4\frac{1}{2}$ in. cylinders. It was not a question of operation with that motor that made a decided impression but its accessibility as compared with the eight. Both blocks of cylinders were of the "L" head design. Two camshafts were used so that the valves might be placed on the outside of the job instead of inside of the "V." This made the most accessible motor of the "V" type that the writer has ever seen whether eight or twelve. This was the first commercial design of the twelve-cylinder motor that the writer has ever seen although he understands that there are two or three others on the road, being thoroughly tested out by companies of the highest reputation. It is quite possible that one or more will be announced this fall.

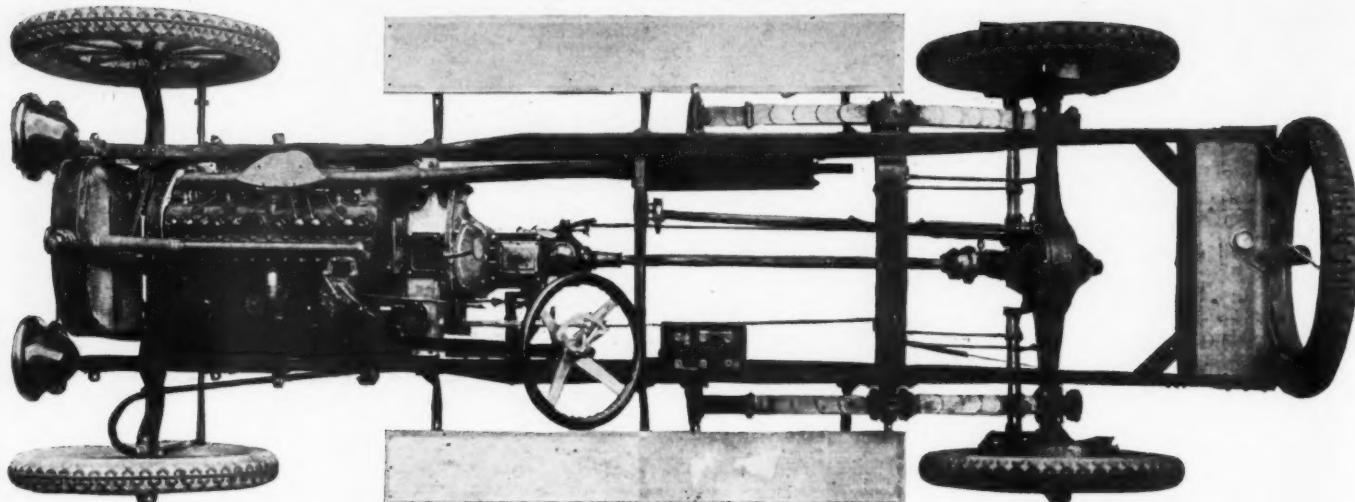
V-Motor Timing

There are two general ways of timing the eight-cylinder motor as practiced to-

day. One is to fire the diagonally opposite cylinders; for example: 1/8, 3/6, 4/5, 2/7. The other is to fire opposite cylinders, 1/5, 3/7, 4/8, 2/6. This counts the cylinders from 1 to 4 in the right-hand block and 5 to 8 in the left-hand block, starting at the forward one in each case. The first firing order can easily be remembered in either one of two ways: first, the sum of the numbers of each pair of cylinders is nine. For example 1/8 equals nine, or 2/7 is nine. The other way of remembering it is by drawing the diagonals from the cylinders firing in consecutive order. Thus the diagonal from 1/8 passes through the center of the diagonal from each of the other three pairs, 3/6, 4/5, and 2/7. In other words they have a common center. Try it and see. The same rule holds good for the twelve-cylinder motor. For example the firing order of one twelve is 1/12, 5/8, 3/10, 6/7, 2/11, 4/9. The sum of the cylinder numbers in each pair is 13. Here again the cylinders fire diagonally, as mentioned above, and they may be checked up in the same manner.—CHESTER S. RICKER.

12,000 Cars Estimate for Arizona

PHOENIX, ARIZ., July 31—It is estimated that more than 12,000 automobiles will be registered in Arizona during the year 1915. This estimate is based on the fact that during the first six months of the year there were 5851 automobiles registered. Mining and industrial conditions generally are highly satisfactory.



Westcott six chassis showing new Continental power plant with Warner disk clutch and three-speed gearset

Westcott Concentrates on Two Sixes

New Edition of the Seven-Passenger Model
and a New Small Six Similar in Design—
Power Plant and Body Lines Entirely New

FOR 1916 the Westcott Motor Car Co., Richmond, Ind., offers a new edition of the six-cylinder, seven-passenger, model U-50, at \$1,595, and a brand new small six like the other in appearance and design, at \$1,295. Thus, the four of 1915 has been discarded. The U-50 now is called the model 51 and is selling at a price only \$10 higher than the 1915 car, but with considerably more than that amount of improvement.

The whole car has been gone over and where a betterment could be made, while keeping the weight, appearance, strength, etc., to the company's standards, it has been done. The power plant is new, the body also, the springs are stronger and longer, the radiator has better lines, the frame has been altered, the wheels made stronger, the tire size increased, the wheelbase increased, and any number of other changes made.

Power Plant Entirely New

The Westcott model 51 power plant is entirely new, being composed of a Continental $3\frac{1}{2}$ by $5\frac{1}{4}$ motor instead of that used in 1915, a Warner, Muncie, disk clutch instead of a cone, and a Warner three-speed gearset instead of that employed previously. These changes have resulted in more power, the old motor having dimensions, 3 by 5, better throttling, because of the new type of clutch and more efficient all-around performance.

There is nothing in the power plant which is out of the ordinary. The motor has its L-head cylinders cast in block with the exhaust manifold on the right, with the valves and the carburetor on the left, feeding through cored passages. The carburetor is a new type Rayfield. Directly behind the carburetor is a Stewart vacuum feed tank bolted to the cylinder casting by a small bracket. The Delco cranking, lighting and ignition unit is on the right at the rear so as to start the motor through the toothed flywheel and in front on the same side is a Stewart tire pump driven from the water pump shaft. The tire pump is added equipment for

1916. This model Continental motor uses a three-bearing crankshaft with bearing sizes as follows: Front, $2\frac{3}{16}$ diameter by $2\frac{1}{8}$ long; center, $2\frac{7}{32}$ by $2\frac{1}{8}$; rear, $2\frac{1}{4}$ by 3. It drives a three-bearing camshaft through helical gearing. The camshaft bearings have the following dimensions: Front, $2\frac{19}{32}$ by $1\frac{1}{2}$; center, $2\frac{1}{8}$ by $1\frac{1}{8}$; rear, $1\frac{1}{2}$ by $1\frac{1}{8}$, the first dimension given being diameter. There is nothing of unconventional design about any of the other parts, such as pistons, rods, etc. The former carry three rings, $\frac{3}{16}$ in. wide. Valves are $1\frac{11}{16}$ in. diameter.

The oiling system is the same as in other large Continentals—force feed and splash using a horizontal plunger pump driven from the camshaft by eccentric action forcing oil through copper pipes to the timing gears and rear main bearing. The oil drains back to the oil pan where it is used for splash for the cylinders and pistons.

In the power transmission system there is a tubular shaft fitted with Spicer joints and a Timken rear axle with spiral-bevel gears, these members having been used in the 1915 car in practically the same form. There has been a slight change in the torque member which now has a steel hanger in front instead of one made of malleable iron.

Cantilevers of Chrome-Vanadium Steel

The cantilever rear springs, while they are of the same design as in the 1915 car, now are made of chrome-vanadium steel instead of carbon steel in order to obtain stronger construction. The front springs are unchanged.

The frame has been altered in the rear so that it extends beyond the rear cross-member so as to form a gasoline tank support. In the older models brackets were riveted to the frame and the tank suspended from the brackets. The new construction is much stronger than that previously used and there is not as much strain on the frame cross-member. Also the tire carrier is incorporated in the frame extension, and the gasoline tank now has a gooseneck filler so that there will be no inconvenience in pouring gasoline even from a

large container. This is a small feature of convenience which is indicative of the thoughtful design characterizing the cars.

The steering post is of Gemmer make for 1916, the fenders are heavier and slightly broader, the foot control pedals have been made easily adjustable and all the sheet metal work on the car securely bolted so as to prevent rattling.

Wheelbase 1 In. Longer

The rear wheels are stronger and in order to insure rigidity alternate spokes are bolted to the brake drum. The wheel rims are now Firestones instead of the straight side, one-piece variety, and carry 35 by 4½ tires instead of 34 by 4, the tires being Kelly-Springfield non-skids all around. The wheelbase now is 126 in. instead of 125.

Body Entirely New

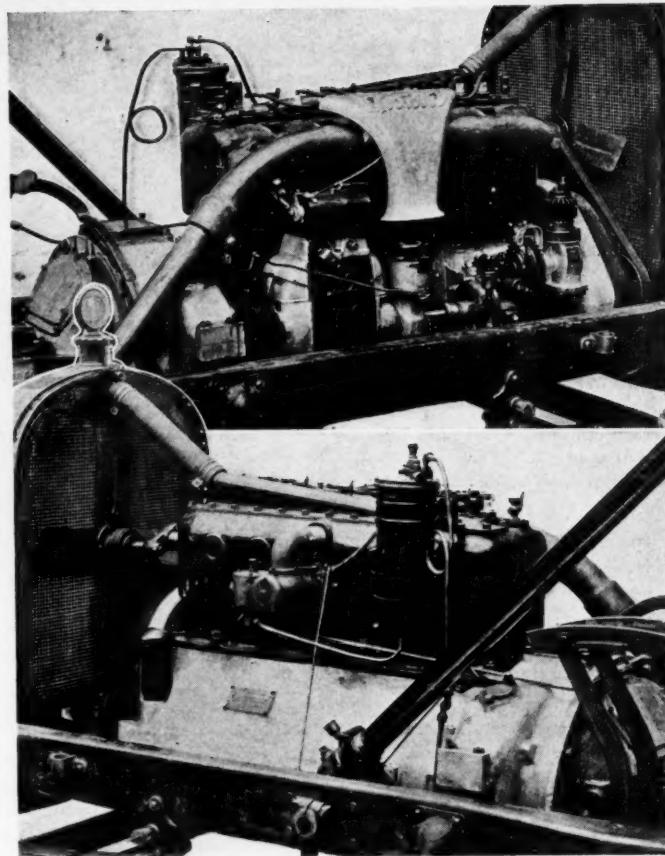
The body is an entirely new job, larger than the previous one with additional equipment, and with better lines. In order to get a better slope from cowl to radiator the latter has been made 1 in. narrower and 1 in. higher and there has been a rounding out of the sides just back of the hood. This rounding out has been extended to the rear of the body.

In order to do a better job of the divided front seats the backs of these now run into the body moulding which is of black wood. The seat moulding at the top also is of this wood and at the junction of seat and body moulding, the two are gracefully curved into one another. These seats now are hollow underneath, so as to accommodate the two extra folding chairs which when placed away may be covered by a neat flap. Also when the extra seats are not in use the floor slots are completely covered by carpet.

While there has been a tonneau light in the back of the right front seat in the older models, the 1916 cars have this, and in addition, a cigar lighter in the back of the left seat.

Under the rear seat there now is an easily-removable plate so that when the rear seat cushion is removed it is an easy matter to get at the differential housing to fill or drain it.

The upholstery is of new design and is called straight piped. In this the leather is formed into folds which are stitched, thus doing away with buttons and making a more sanitary method. The upholstery now is of bright leather instead of dull.



Both sides of the Westcott six power plant for 1916 showing mounting of the Delco electric system

The cowl has been changed so as to accommodate the new instruments necessary with the changes in the power plant. There now is an oil pressure gage instead of a sight feed, and a new ammeter.

In the equipment there is a new type of windshield with overlapping halves and a Boyce Motometer, which was not used on the 1915 cars.

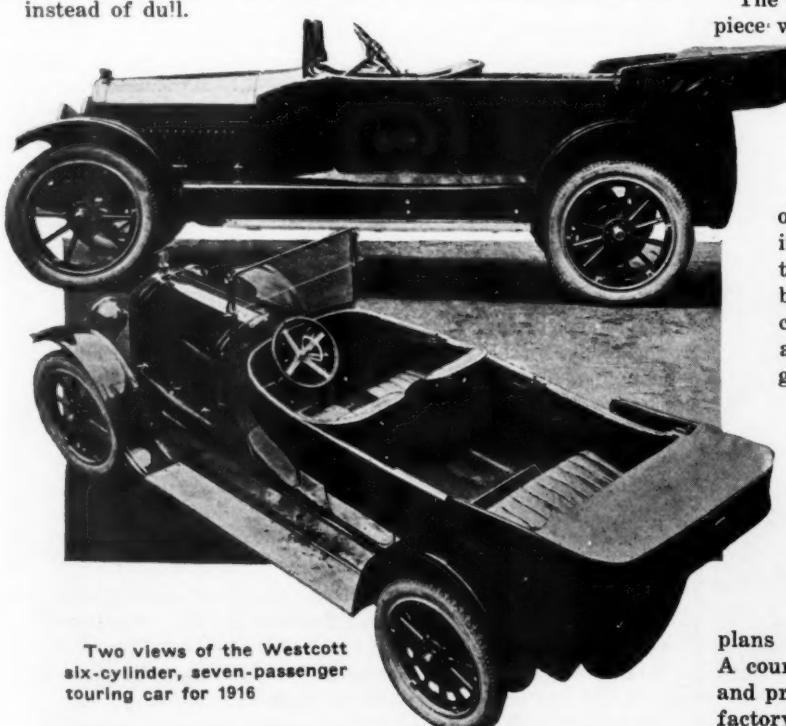
The top is a new one-man type with the rear portion of one piece with an oval window, and extending part way around the body. The Jiffy curtains furnished are fitted with springs to prevent flapping.

Small Six Similar in Design

To describe the small six would be to repeat the information just given relating to design. The only differences between the large and small models are in the wheelbase, which on the latter is 120 in., the tires, which are 34 by 4, the motor, which is 3½ by 4½, but of the same make and design, and in the body capacity and equipment. The body is a five-passenger and is not fitted with a cigar lighter, nor is a Motometer given.

Dunwoody Adds Automobile Course

MINNEAPOLIS, MINN., Aug. 1—The Dunwoody Institute, endowed at about \$2,000,000, has added automobile mechanics and is erecting a garage and shop adjoining the main building. It is the plan to negotiate with garage proprietors to take over the graduates as fast as they are turned out. The school plans to raise the standard of motor car mechanics. A course for inexperienced men will be two years of theory and practice. For a diploma a graduate must spend a satisfactory year as an employee.



Two views of the Westcott six-cylinder, seven-passenger touring car for 1916

Stutz Features New Bodies

Mounted on Two Four-Cylinder Chassis

IMPROVEMENT of body design will strike the average observer as the most noticeable change in the line of the Stutz Motor Car Co., Indianapolis, Ind., although there have been minor chassis changes of interest. The new bodies are mounted on four-cylinder chassis only and these are the same in every respect with the exception of the wheelbase, one being 120 and the other 130 in. as in 1915.

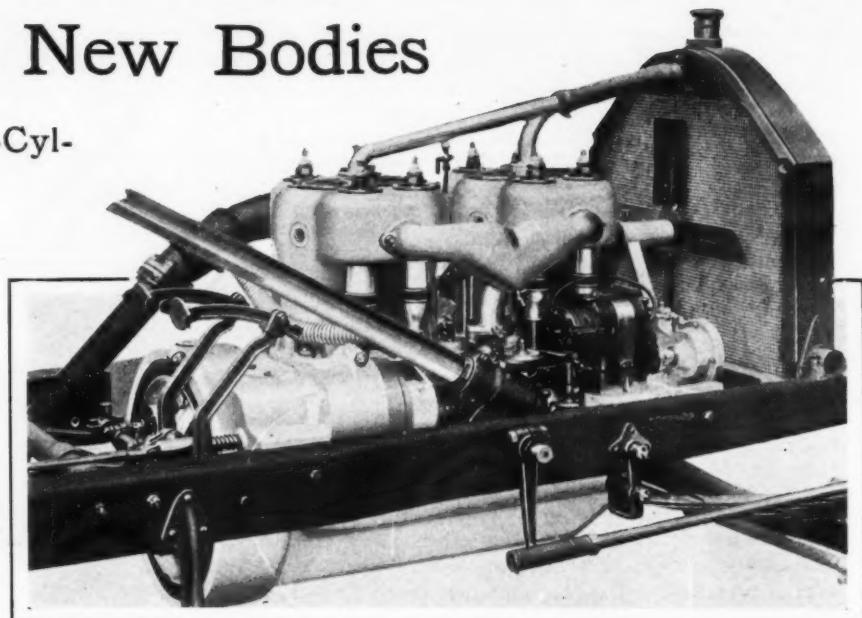
There are three body styles for the smaller car as follows: Bearcat at \$2,000, roadster at \$2,100 instead of \$2,000 and Bulldog at \$2,250. On the 130-in. car there are two standard bodies, a newly-designed four-passenger Bulldog special having a double cowl and selling at \$2,550 and a four-passenger touring car at \$2,300 instead of \$2,275.

While the general features of Stutz design are generally known and the changes made are of no radical nature, admiration attaches principally to the new bodies, especially the Bulldog special. This has an unusually low-hung appearance with the passenger seats lower than usual. The whole body is a neat streamline job with almost a straight line from windshield to radiator, flush doors and symmetrical sides.

Side Lamps Eliminated

The general smoothing out of the front of the car has been assisted by eliminating dash lamps and using headlights with dimmers. Instead of using wood strips to finish off the upholstery, the new body uses aluminum moulding which not only makes a better appearing finish but is more serviceable.

The tonneau cowl has two compartments, one being designed for carrying a lunch kit and the other for two Thermos bottles which are part of the equipment. The cowl material is Circassian walnut.



Intake side of Stutz power plant for 1916 showing mounting of the Remy starting motor and Stromberg carburetor

This car comes regularly equipped with wire wheels and Silvertown cord tires which add to its racy appearance, a new type of windshield which is not as high as the ordinary type and a searchlight.

The other touring car body, while it has the same general lines as the Bulldog special, has low individual front seats which make front seat riding extremely comfortable. There are only two doors and these are in front so that tonneau passengers must pass through the aisle between the front seats in order to get to the rear seat. The elimination of the doors in the rear and the removal of dash lamps, as in the special, has offered the designer a means of getting a well-rounded out streamline body with no eccentric design and yet giving a low, rakish appearance. The upholstery in this model is finished as in the other and the equipment is the same with the exception of the wire wheels, tires and Thermos bottles.

Roadster Now Fully Equipped

The roadster now comes fully equipped and this is largely responsible for the increase of \$100 in the price. The body has been improved by bringing the seat upholstery flush with body sides and increasing the length of the cowl line. The back of the seat has been rounded more, and as in the others, the dash lamps have been abandoned. There now are doors on either side instead of on the left side only as in the 1915 model.

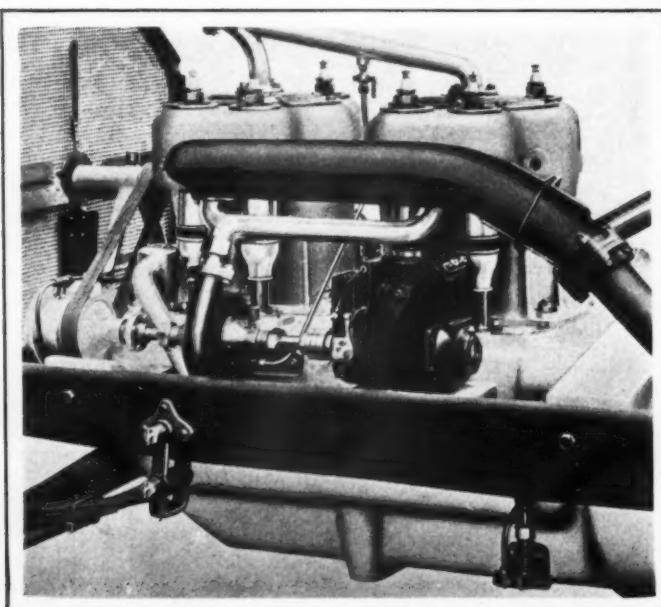
In the Bearcat model there have been no apparent body alterations.

The most important mechanical change is the enlarging of the oil receptacle in the crankcase so that it now holds 2½ gal. instead of 1½, this having been made so that less oil changing is needed. The crankcase has been increased in size and at the same time it has been given a more symmetrical appearance.

Stutz springs, while they are of the same design as heretofore, semi-elliptic all around, now are made of alloy-steel instead of carbon-steel in order to obtain greater strength and longer life.

Accelerator pedal operation is facilitated by the addition of a heel pocket in the front floorboard. In the equipment changes made on all models, there is the substitution of Hartford racing type shock absorber for the automatic type, and also the fitting of a Motometer to the radiator.

Stutz cars for 1916 in their general makeup comprise a



Exhaust side of Stutz motor showing Remy generator mounting

four-cylinder, pair-cast T-head motor, a leather-faced cone clutch and the characteristic Stutz rear axle gearset which has been used by this company since its inception. Tires are 34 by 4½ on all except the Bulldog special which uses 33 by 5. As in the past all Stutz cars use right drive and right control and it is one of the few makes adhering to this construction.

The motor is a 4¾ by 5½ with three-bearing crankshaft and camshafts.

The two latter operate roller type push rods, and the valves, which are tungsten steel 2¼ in. in the clear, have the mechanism inclosed by individual housings. The camshaft drive is by helical gearing. There is nothing unusual in the piston or rod construction.

Lubrication is by force feed through a hollow crankshaft, carburetion by a Stromberg model H and ignition by Bosch double-distributer magneto on all models except the touring car which uses Bosch single point.

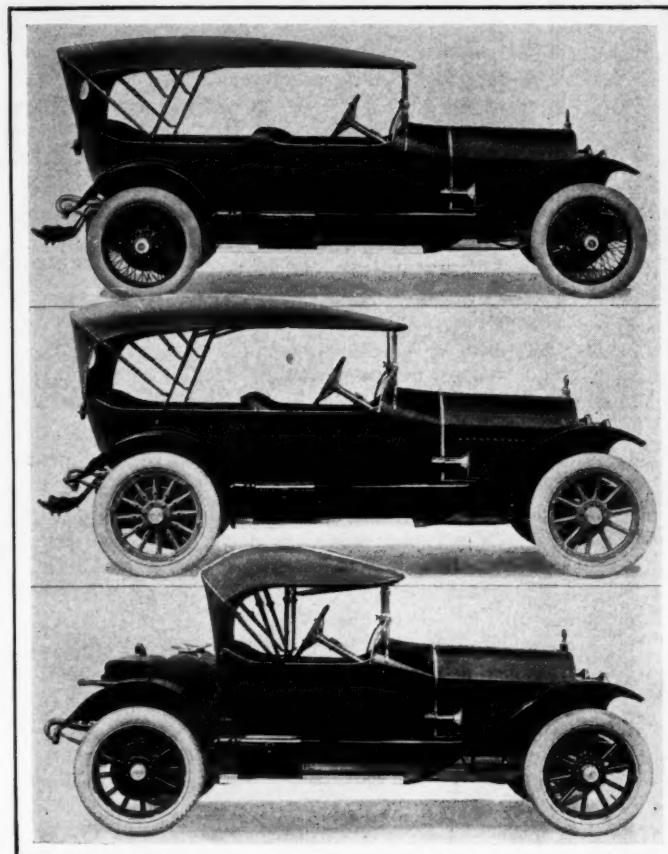
On the right side there is the carburetor feeding through a two-branch manifold to each cylinder block, and the magneto which is driven directly from the timing gears. The latter is mounted on a platform which is part of the aluminum crankcase. Also on this side but in the rear is a Remy cranking motor.

On the left is the Remy generator driven from an extension of the water pump shaft as illustrated, and the exhaust manifold which has a hot air attachment feeding through flexible tubing to the carburetor.

The Transmission System

The cone clutch, with springs beneath the leather to effect easy engagement, is continued unchanged. The pedal may be adjusted to suit the driver's requirements, the length variation being 2½ in. Continuing in the drive, there is an inclosed propeller shaft, the torque tube surrounding it attaching to a face plate back of the clutch. A three-speed gearset is mounted on the rear axle the gearset bearings being balls. The rear axle, which is a semi-floating design uses tapered-roller bearings on the inner ends of the shafts and ball bearings on the outer ends.

The Stutz company offers many color options for its bodies, these being, vermillion, Monitor gray, Mercedes red, yellow



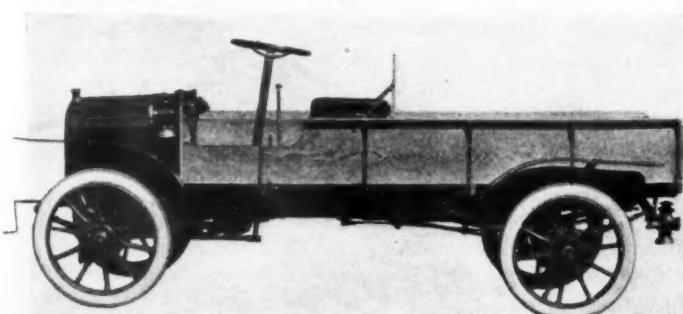
Top—Stutz four-passenger Bulldog special which sells for \$2,550. Middle—Bulldog model which lists at \$2,250. Bottom—Roadster marketed for \$2,100

and white for the Bearcat; Red, blue, battleship gray and white are offered on the Bulldog; vermillion, gray, white and red on the roadster and red, blue, white and gray on the Bulldog special. Upholstery color options for the coming season are red, green and black.

Falcon Truck of 1000 Lb. Capacity

One of Detroit's most recent additions to the commercial vehicle field is the Falcon Motor Truck Co., which has been organized by A. B. Mallow of Detroit; F. B. Houston of South Charleston, Ohio, and A. B. Hazzard of Detroit. The Falcon will be a truck of 1000 lb. capacity with 1200 lb. capacity as a maximum. The price will be \$750. A. B. Hazzard, well known as an efficiency engineer in the East and Middle West, is the designer, and the first vehicle has been under thorough road test for some time. The company has en-

gaged factory quarters at 811 West Jefferson Avenue, Detroit. A. B. Hazzard, engineer of the Falcon company, was general manager of the Morton Poole Co. of Wilmington, Del., from 1906 to 1914, manufacturing high-grade machine tools. Previous to going to Wilmington he was one of the department engineers of the Rand Drill Co. of New York. The Falcon has a four-cylinder motor with 22 hp., cooled by the thermo-syphon system. The radiator is set in a pressed steel shell. Ignition is Atwater Kent and the clutch is a cone. The carburetor has a final set adjustment and is a Modern with a hot air connection. Lubrication is constant level maintained with positive action pump. This is connected with the dash where there is a sight feed. The selective sliding gearset is in unit with the motor and control is from the center. There are three speeds forward and reverse. The springs are semi-elliptic in front and full platform rear. Artillery pressed steel wheels are 30 in. with 3½-in. pneumatic tires. Steering is on the left and is very rigid and adjustable to wear. Wheelbase is 106 in. and tread is 56 in. The Falcon has a pressed steel frame of heavy channel section and the body is 40 in. in width and 9 ft. in length, with a single seat for the driver. The front axle is I-beam, forged and heat-treated. The Falcon has a capacity of 1000 to 1200 lb., and the price will be \$750.



Falcon 1000 lb. truck fitted with express type body. This vehicle is sold by the Falcon company for \$750

The Rostrum



Why Two Brakes Are Necessary

EDITOR THE AUTOMOBILE:—In THE AUTOMOBILE I have noticed that M. P. B. of Beacon, N. Y., wants to know why two sets of brakes are used on a car. If he would borrow his neighbor's car and drive it up an incline, apply the service brake till the car comes to a standstill, then release the brake and see how nicely the car starts to roll down the hill, he would know.

Like many others, M. P. B. seems to have the wrong idea of an emergency brake. A great many people think this brake should be used only in case a terrible accident were impending.

A young man in Dallas last week, driving for the third time, applied the so-called emergency on a short curve in Cliff Park so tightly that it took two men to release it. It turned the car completely over, killing him and his wife.

Dallas, Tex.

D. C. E.

—There is no doubt but that in many respects the words "emergency brake" are a misnomer. The emergency brake is not primarily intended for short stops in dangerous situations, as the name would imply, but rather, as you suggest, to hold the car stationary on an incline. It is unfortunate that the name "emergency brake" ever became applied to the hand brake of an automobile because the very name has caused people to misuse it with disastrous results to themselves, as you suggest in your communication.

It must be remembered that to bring the car to a stop in a most efficient manner it is not necessary to lock the wheels; in fact, a car will stop quicker if the brakes hold the wheels just short of locking them than if they are locked. The reason for this is simple. When the wheels are locked the car becomes virtually a sled, sliding along the ground with nothing to stop it except the frictional resistance between the

glazed tire and the road or any obstacle which it may hit. Once the wheels are locked the brakes are of no more effect. The motion of the car has passed beyond the control of the driver because neither the ordinary stopping mechanism nor the steering gear has any more effect. He is powerless to alter the direction or speed of the car, and when the brake is locked on, as it sometimes is, in a moment of panic where the hand brake is jerked back with the power lent by fear, the car is apt to turn across the road or into a ditch without any means of stopping it.

Unless the car is standing still the wheels should never be locked. Not only does it put the car out of control, but it acts in such a way on the tires that their life is considerably shortened. A driver who dashes along at 20 or 25 miles an hour toward the curb and then brings up his car short by jamming on his brakes, is not only a poor driver but is extravagant and uneconomical in the handling of his car. In the same manner the driver who approaches a sharp curve at a high rate of speed and does not stop until he suddenly throws on his brakes within a few feet of the danger spot, is courting disaster.

The so-called emergency brake has many uses and it could not be dispensed with, but at the same time it should not be misused. One of the places where a hand brake is a matter of almost necessity is in starting a car on an incline. Without the brake to hold the car in position it would be apt to roll backward, rendering it impossible to put the gears in mesh. It is also of use where the service brake becomes so worn as to be unreliable, but in these cases the hand brake should only be used long enough to enable the operator of the car to bring it to a place where he can have the service brake renewed.

Preventing Clutch from Grabbing

Editor THE AUTOMOBILE:—I have just bought a 1912 Herreshoff roadster. The clutch grabbed very viciously and on inspection I found that the previous owner had been running it dry. I filled the car with thin oil, but with the oil in I cannot throw the clutch out completely. I drew off the oil and thoroughly cleansed the clutch with kerosene. With the kerosene in the case the clutch works all right, but grabs very little. On putting back the oil again the clutch still pulls when thrown out. Would it matter if I ran the clutch dry or in kerosene? What would you advise?

Philadelphia, Pa.

O. S. R.

—If the clutch works satisfactorily with kerosene as a lubricant it would be very good practice to keep the kerosene in the housing. Quite frequently a half-and-half mixture of kerosene and light cylinder oil is employed to hold the good qualities of a clutch. The half-and-half mixture would probably work very well in your case. If the clutch drags somewhat the pedal throw adjustment should be altered so that the clutch is removed further from engagement.

Setting Up Connecting-Rod Bearings

Editor THE AUTOMOBILE:—Will you kindly describe the best way to set up connecting-rod and main bearings for casting? If possible give illustrations thereof.

I refer mainly to such bearings that overlap the sides of the bearing cap as is common in die-cast bearings.

Babylon, L. I.

P. K.

—The common method of procedure is to set up the connecting-rods in a fixture, which is fitted with a mandrel a little smaller than the inside of the finished bearing. This fixture has a recess at the top and bottom, which allows the metal to partially flow over the sides of the connecting-rod, forming the flanges on the finished bearing.

The babbitt is poured through a hole in the top plate. Upon removing the connecting-rod from the fixture the babbitt lining is found cast in place. A swedge is then forced through the bearing in order to make sure that the lining is in perfect contact with the connecting-rod at the back. The bearings are then scraped or reamed in the usual manner for fitting bearings.

Suggestions regarding the manner of carrying out this work have been given by one of the large manufacturers of babbitt as follows:

1—Use an absolutely clean ladle and pot. When the metal is hot enough to brown a piece of paper or white pine stick, stir thoroughly and remove any skimmings caused by oxidation.

2—Be sure the faces of boxes and mandrels are clean and free from grease or dampness.

3—Pour rapidly into the box, holding the ladle as closely to the work as possible to avoid air bubbles, until it is half full; then pour gradually until filled, allowing large enough gate to take up shrinkage. When pouring castings with wide surface use ladle with wide lip.

4—To insure perfect boxes in pouring large bearings it is advisable to run chalk on mandrel or shaft and to have the mandrel hot. Mandrel and box should be about same temperature.

5—Do not keep babbitt metal at the melting point longer than absolutely necessary, as the chemical action of extreme heat tends to oxidize a composite alloy, causing deterioration, disintegration, addition to its brittleness, and materially affecting its anti-friction qualities.

6—When necessary to peen, it is best to commence up and down a center line, extending blows right and left of this line until tightened in place.

7—Finally, when you have a good metal, treat it as such and you will have no occasion to complain of the results obtained.

How to Splice Inner Tubes

Editor THE AUTOMOBILE:—I have several good inner tubes with some bad tears in them. What repairing outfit and what materials do I need for cutting out a section, say 6 in. long, and inserting a new section?

A. E.

—The large car concerns can supply you with a pair of mandrels for making this repair. The sections to be inserted can be either secured from old tubes of the same size, if any can be found which are in good condition, or when these cannot be secured the larger tire concerns can supply you with tubing of the proper diameter. The set of mandrels for splicing the tubes consists of a pair of these devices, one fitting within the other. They are shown at A and B, Fig. 1. One end of the tube is pulled through the mandrel at A and turned back over the edge about 4 in. The other side of the part to be spliced on is pulled through the mandrel B and turned back over the edge about 8 in. It is then pulled back toward the other side a distance of about 4 in. The edges are then beveled and buffed, as shown in the illustration, and one heavy coat or two light coats of pure gum cement are applied. The cement is then allowed to dry thoroughly, a condition which can be determined by the tackiness of the cement to the touch.

Precaution should be taken in joining the tubes that the inner tube is not twisted, but that the ends meet correctly so that when joined there will be no twist in the tubes. Acid curing solution is applied with a wide, soft brush to the part which has been cemented, and then the end of the tube on mandrel A is transferred to the end of the tube on mandrel B. The spliced ends are then immediately wrapped with strips of muslin or strips of inner tubing. From 15 to 20 min. is sufficient for the acid curing solution to form a good union. When the joint is unwrapped the tube is removed through the slots in the mandrels and the splice is complete.

It is stated that acid-cured splices will not loosen and are not affected by heat from the tire. On this account they have a decided advantage over the old method of splicing with cement only, a process which is known as the cold method.

If the splice does not cure together it is an indication that the work has not been done quickly enough after applying the acid solution, or that certain solvents in the acid solution have evaporated. To avoid this latter trouble the acid solution should be kept in a glass bottle, jug or earthenware vessel and tightly corked when not in use.

The Firestone company gives the following advice after making a repair on an inner tube: First, see that the washers on the valve are screwed down tightly at the base so that they don't leak. Two, see that the plungers or valve insides are not worn and that they are in good working condition. Three, inflate the tube, testing it in water to see that there are no small leaks which may have been overlooked during the work. Four, see that the proper length of valve is used with the tube. Short valves are used for regular clincher tires or quick detachable, and the long or extension valves when the tires are used on demountable rims such as are on the late cars.

Misalignment Causes Grind in Differential

Editor THE AUTOMOBILE:—How fast should a 1912 Buick model 36 roadster be able to travel?

2—Would oversized tires help to run it any faster?

3—What would cause a grind in the differential when the car is coasting? It is all right so long as it is pulling.

4—How fast should a 1914 Maxwell 25 travel when in good condition?

5—What would you recommend to increase the speed of the Buick car?

Hartford, Conn.

L. H. S.

—This car should be able to travel 50 m.p.h.

2—Oversized tires would not help the car to go any faster; in fact, the tendency is to reduce the speed somewhat when oversized tires are used.

3—The only cause of a grinding noise in the differential would be first, a serious misalignment or maladjustment of the two gears, and second, a foreign substance in the gear-case. Any such noise as this is more apparent when the car is coasting ahead of the motor, as this allows the rear wheels to take up the back lash in the driving gears. This should be taken to a first-class garage where a mechanic can take up the play and put the gears in proper mesh.

4—These cars can probably travel 50 m.p.h., although the speed will depend so much upon the condition of the car and motor that it is not possible to say definitely.

5—The speed could probably be increased by advancing the timing and increasing the gear ratio between the motor and the rear wheels.

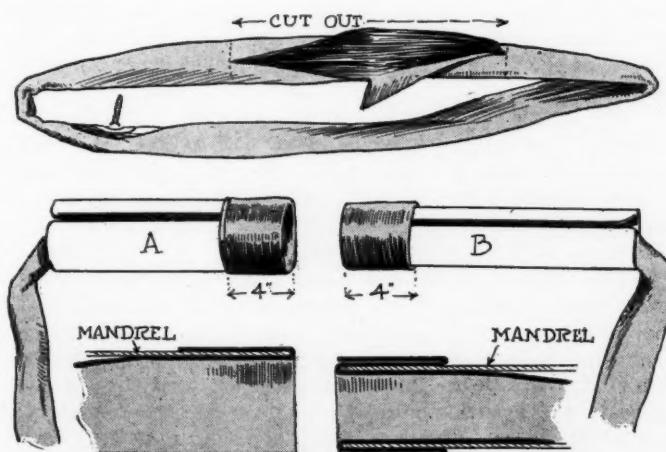


Fig. 1—Diagram illustrating method of splicing an inner tube with a mandrel. Mandrel A is pushed up close to the mandrel B and the turned over portion on A is turned over onto the doubly turned portion on B to make the splice.

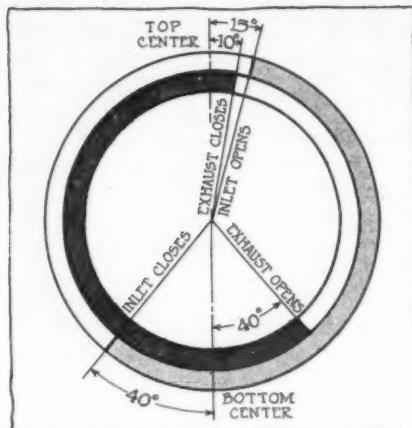


Fig. 2—Timing diagram in common use

Has Difficulty in Changing Gear

Editor THE AUTOMOBILE:—I have a 1915 Oldsmobile, model 42, and have never been able to change gears from high back to intermediate without slowing down to 5 or 6 m.p.h. I have tried every way. By throwing the lever back in second very quickly at the same time the clutch is thrown out, also to hesitate a very short time in neutral, also to speed up the engine a little while in neutral, and none of these ways help.

My garage man says my clutch does not stop quick enough and has no adjustment on it. He can change gears backward better by not throwing out the clutch at all.

Tyler, Tex.

—The fact that the car has to be slowed down to such an amount before you can change gears shows that there must be some binding in the gearbox which immediately checks the speed of the gears to such an amount that you have to slow down in order that they revolve at the proper rate of speed to engage themselves. In view of this it would be well to examine the gearbox and see if the gears are properly lubricated, and especially if the layshaft is bound in any way which prevents it from rotating freely. It is evident that one gear is rotating so much more slowly than the gear which you desire to mesh with it that it is necessary to reduce your speed almost to a stop before you can engage the gears. This should not be the case on intermediate gear, although it very often happens on low gear where the reduction is so great that the relative car speed must be quite low. On intermediate speed you should be able to drop into gear at 20 m.p.h. without any appreciable clash. It may be that you can overcome the trouble to some extent by making your changes exceedingly quick, being careful to throw the gear over swiftly at the same time that the clutch pedal is depressed.

No Intake Charge Is Lost

Editor THE AUTOMOBILE:—I have noticed that the inlet valve of a motor remains open some 30 to 50 deg. past bottom center. I should think this would allow some of the charge taken in to be expelled. Why is this?

Pelham, N. Y.

—The reason for the intake valve remaining open beyond lower dead center is to take advantage of the inertia of the incoming gases which have been set in motion by the piston on its suction stroke. As the piston descends on the intake stroke with the intake valve open it tends to pull the gases in the intake manifold after it. This suction starts the intake gases in motion, with the result that they pour rapidly into the cylinder to fill the partial vacuum in the combustion space. When the piston reaches the bottom of its stroke these gases are still in motion, pouring into the cylinder, and contain a certain amount of energy which causes them to continue in that direction. In addition to this

Horsepower and Torque Curves of Moon 6-40

Editor THE AUTOMOBILE:—I note in the last issue of THE AUTOMOBILE in the Rostrum that a number of horsepower curves of different makes of motor are furnished together with the torque curves. I have a model 6-40 Moon car which has a 3½ by 5 motor and I would like to know the brake horsepower developed at different speeds, together with the torque.

J. E. S.

—The horsepower and torque of the Moon model 6-40 are shown in Fig. 3. These curves indicate the brake horsepower and torque at the different r.p.m. between 600 and 2000. It will be noted that the horsepower is just above 15 at 600 r.p.m. and at 2000 it is above 47. The torque is at a maximum between 1000 and 1200 r.p.m. The torque is measured in pounds at a radius of 15 in. and to reduce this to foot pounds it is necessary to multiply by fifteen and divide by twelve.

The S. A. E. horsepower of this motor is 29.40 which, according to the curve, is developed at about 1050 r.p.m. The point of maximum torque coincides with about the point of S. A. E. horsepower although the torque curve is quite flat between 1000 and 1200 r.p.m.

there still remains a partial vacuum in the cylinder which aids in maintaining the entrance of the gases.

It takes an appreciable time before the pressure in the cylinder reaches atmospheric pressure and before the inertia of the gases has dropped to such a point that they no longer tend to rush into the cylinder. For this reason in arranging the valve timing engineers leave the valves open for some distance past lower dead center. It must be remembered that, for a crank angle of 30 deg., the piston only travels on the upstroke about 5 per cent of the total distance. In other words, for a motor with 4-in. stroke, the upward travel of the piston for a crank angle of 30 deg. will only have been 0.2 in. For the angle of 50 deg. the travel of the piston on the upward stroke is about 14 per cent of the total travel, or, in other words, in a motor of 4-in. stroke the travel at the extreme angle of 50 deg. would be just a little over $\frac{1}{2}$ in. It can readily be seen that this small travel of the piston would not begin to drive the gases out of the valve on account of the inertia of the incoming charge and the partial vacuum still remaining.

This upward travel of the piston with the intake valve open undoubtedly represents a loss of volumetric efficiency in the motor, but there are no motors in existence which have perfect volumetric efficiency, and the 5 per cent loss with a 30 deg. angle of valve closure would not make any material difference.

Explanation of High-Mica Trouble

Editor THE AUTOMOBILE:—Would you be kind enough to explain through THE AUTOMOBILE the reason for the action of the Wagner motor generator and cut-out due to high mica, as explained in your answer to H. Eulburg in the June 17 issue?

I am not familiar with the machine or its means of regulation but, comparing your answer with the conditions, there are a few things which are not clear to me.

If the brush contact was so poor that the machine did not generate enough voltage to close the cut-out, closing it by hand would allow the battery current to excite the fields, raising the armature voltage high enough to support itself and charge the battery; but if the speed of the machine was lowered so its voltage dropped to zero, I do not see how the cut-out could close by itself even if the speed were again raised, for the conditions would be the same as when it was first started. Also I should think there would be bad fluctuating of the ammeter at low speed and a very noticeable falling off of the charging current at high speed, due to the very poor brush contact caused by the action between the brushes and the mica. Please state regulation used.

Bronx, N. Y.

A SUBSCRIBER.

—Assuming that the brush contact was so poor that the machine did not generate enough voltage to close the relay, closing it by hand would allow the battery current to excite

the fields, raising the armature voltage high enough to support itself and then charge the battery. If the speed of the machine was lowered so that its voltage dropped so low that the relay opened itself, and then the machine was again speeded up, there would be a small amount of residual magnetism which would assist the dynamo to pick up and start generating again. The residual magnetism would not be sufficient if the machine had been shut down for any length of time, and, therefore, when first starting the engine, it might be necessary to close the relay by hand and allow the battery to excite the generator field in order to make the generator pick up. No external regulating devices are used in these outfits. All the regulation necessary is secured from the inherent regulation of the generator itself.

Trucks Used by U. S. Quartermasters

Editor THE AUTOMOBILE:—What are the different makes of automobile trucks used by the United States Army, Q. M. D.?

Fort Warren, Mass.

W. S.

—The following tabulation shows a total of sixty-one motor trucks used by the U. S. Army Q. M. D., and is complete up to June 30, 1914:

MAKE	STATION	BY WHOM USED
Alco, 1912	West Point	Quartermaster Corps.
Alco, 1912	West Point	Quartermaster Corps.
White, 1911	West Point	Quartermaster Corps.
Atterbury, 1913	Galveston	Quartermaster Corps.
Jeffery, 1913	Galveston	Quartermaster Corps.
*White, 1914	Galveston	Quartermaster Corps.
White, 1913	Galveston	Quartermaster Corps.
White, 1913	Galveston	Quartermaster Corps.
Automatic, 1912	Philadelphia	Quartermaster Corps.
Electric, 1907	Philadelphia	Quartermaster Corps.
4-Wheel drive, 1912	San Diego	Quartermaster Corps.
White, 1912	San Diego	Signal Corps.
Gramm	San Francisco	Quartermaster Corps.
Mais, 1910	San Francisco	Quartermaster Corps.
Packard, 1910	San Francisco	Quartermaster Corps.
Packard, 1910	San Francisco	Quartermaster Corps.
White, 1910	San Francisco	Quartermaster Corps.
*White, 1914	San Francisco	Quartermaster Corps.
Mack, 1911	Washington	Quartermaster Corps.
White, 1912	Washington	Quartermaster Corps.
White, 1911	Washington	Quartermaster Corps.
Wilcox, 1911	Washington	Quartermaster Corps.
White, 1913	Washington	Quartermaster Corps.
Mais, 1910	Fort D. A. Russell	War College.
Mais, 1910	El Paso	Stored.
White, 1913	El Paso	Quartermaster Corps.
*White, 1914	El Paso	Quartermaster Corps.
Sampson, 1911	Fort Sam Houston	Quartermaster Corps.
White, 1913	Honolulu, Hawaii	Quartermaster Corps.
White, 1913	Vera Cruz, Mexico	Quartermaster Corps.
White, 1912	Fort Huachuca	Quartermaster Corps.
White, 1913	Fort Sill	School Fire.
*White, 1914	Washington Barracks	Quartermaster Corps.
Mais, 1910	Marfa	Quartermaster Corps.
Mais, 1910	Fort Leavenworth	Quartermaster Corps.

TRUCKS PURCHASED DURING FISCAL YEAR 1914

MAKE	CAPACITY, TONS	WHERE USED
White	5	San Francisco, Cal.
White	1½	Marfa, Tex.
White	1½	Galveston, Tex.
White	1½	El Paso, Tex.
Driggs-Seabury	2	New York
Federal	1½	El Paso, Tex.
Jeffery	1½	Eagle Pass, Tex.
Kelly-Springfield	1½	Sam Houston, Tex.
Lippard-Stewart	2	St. Louis, Mo.
Lippard-Stewart	1½	Rio Grand City, Tex.
Lord-Baltimore	1½	Brownsville, Tex.
Mack	1½	Fabens, Tex.
Mack	1½	Washington Depot
Studebaker	1½	El Paso, Tex.
Studebaker	1½	El Paso, Tex.
Velle	1½	Fort Rosecrans, Cal.
Velle	1½	Fort Rosecrans, Cal.
Velle	1½	Hachita, N. M.
Velle	1½	Douglas, Ariz.
Velle	1½	Nogales, Ariz.
Velle	1½	Marfa, Tex.
Velle	1½	Marfa, Tex.
White	1½	Galveston, Tex.
White	1½	Galveston, Tex.
White	1½	Galveston, Tex.
White	1½	Galveston, Tex.
White	1½	Honolulu, Hawaii
White	1½	Honolulu, Hawaii
White	1½	Sam Houston, Tex.
White	1½	Sam Houston, Tex.

*Included in list of those purchased in 1914.

Probably Carburetor Needs Adjustment

Editor THE AUTOMOBILE:—Can you tell me what is the matter with my Cutting 1913 model B-40? The car runs

well and has just been overhauled, but I can only get 20 miles and then it will start to spit and miss and lose speed and I will have to take it easy for another half-mile, and then it will run all right again until I reach the 25-mile mark again. I have had a Stewart system put on but it does not do any good. The gasoline is good and clean.

Is the carburetor on this car large enough? The motor is a 4 by 5, Wisconsin. What is the speed of this car and the S. A. E. horsepower?

Carver, Minn.

C. E. D.

—The carburetor should be a 1½-in. size, or, in other words, if it is a Rayfield design, as is standard equipment on this make of car, it should measure 1½ in. across the manifold connection. With this size carburetor and with the motor in good condition it is only a matter of adjustment to get the motor operating properly.

The S. A. E. horsepower of this car is 25.6, and it should be able to travel up to 60 m.p.h. with everything in first-class condition.

Wants Parts for Halladay Car

Editor THE AUTOMOBILE:—Where and of whom can I get clutch repairs, also steering device repairs, gears, etc., for a Halladay touring car? It was made in about 1908 or 1909, and has a Rutenber motor.

Buhler, Kan.

L. P. B.

—Repairs for the Halladay touring car can be secured from A. C. Barley, Trustee of the Streator Motor Car Co., Streator, Ill.

Interested in Gasoline Substitutes

Editor THE AUTOMOBILE:—I would appreciate if you would send me the names of people or companies who manufacture a fuel that takes the place of gasoline.

Some time ago I read about a party in THE AUTOMOBILE who was trying out some fuel at the Indianapolis Speedway.

Henderson, N. C.

G. E. B.

—The fuel you refer to is undoubtedly Zoline, which was experimented with by a number of engineers at the Indianapolis track. It was found that the fuel was not practicable and it is no longer in existence.

No Motor Interchangeable with Ford

Editor THE AUTOMOBILE:—Can you give me the name of some manufacturing concern which could build a motor for a Ford that will speed up to 3000 r.p.m.?

Pilot Rock, Ore.

E. R. R.

—We do not know of any concern making a motor which is interchangeable with that of the Ford. If you were to have a special one made by some concern, it would cost such an amount of money, that it would be quite an outlay.

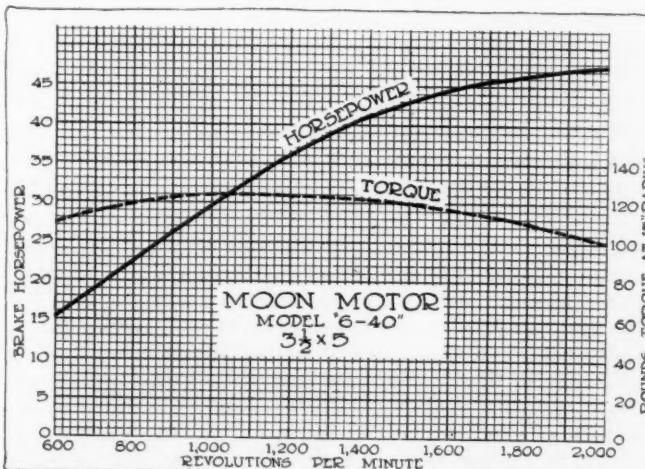


Fig. 3—Horsepower and torque curves of the Moon model 6-40 showing pounds torque at a 15-in. radius

Packard Uses Vibration Damper

American Patent Rights for Lanchester Invention Acquired—Device To Be Used on Twin Six

DETROIT, MICH., Aug. 2—The Packard Motor Car Co. has purchased the American patent rights for the Lanchester vibration damper, buying outright patent No. 1,085,443, granted to F. W. Lanchester Jan. 27, 1914, the Packard company also holding two other patents of a somewhat similar character obtained by Haydon, these being Nos. 795,698 and 800,572.

To Grant Licenses

It is the intention of the Packard company to grant licenses to other manufacturers who may desire to use the damper, and it is understood that the royalty asked would not be very large. As can be seen from the drawing, the damper is small and is quite cheap to manufacture. In the Packard case the loose rim is employed to drive the fan belt and there is only one inner member of the clutch instead of the several used in the original devise. Also dry surfaces of asbestos fabric are used instead of lubricated steel plates.

How the Damper Works

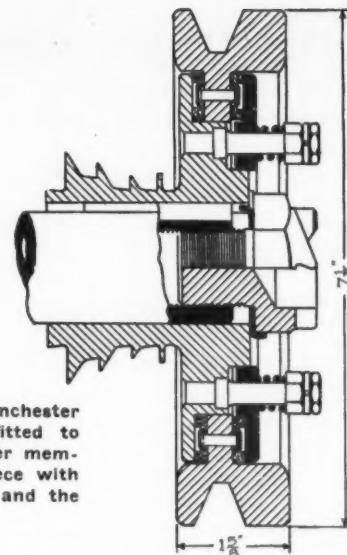
With a six-cylinder crankshaft, whether there be six pistons or twelve, one of the commonest forms of vibration is that produced by the twisting of the shaft at certain speeds. The shaft has a natural period of vibration if deflected torsionally, and when the sequence of explosions coincides with the natural vibration period the pendulum effect causes the violence of the vibration to be increased. The matter was explained fully in THE AUTOMOBILE for Feb. 18, 1915; the vibration which is perceptible to the passengers in the car is due to the front crank throw twisting with each explosion, and then the spring of the crank jerking the piston back as soon as the power stroke is over. Elasticity of the steel causes oscillations to take place, so the crank flies back too far, springs forward again and so vibrates many times before returning to its proper position, by which time the succeeding explosion again displaces it.

Resists Return Spring of Crank

The oscillation of the piston disturbs the center of gravity of the whole piston mass much more than the first deflection does, and the object of the Lanchester damper is to resist the return spring of the crank so that the twist caused by the explosion is made "dead beat."

Lanchester's Original Design

The original design of F. W. Lanchester, a leading British automobile engineer, was to mount on the front end of the crankshaft a little flywheel and disk clutch. The inner member of the clutch was secured to the shaft and the flywheel rim rode loose. Thus when the crank twisted forward the inertia of the flywheel rim caused it to try to maintain a steady speed and the clutch slipped a little, and when the crank tried to twist back at the end of the power stroke the flywheel rim again resisted the tendency to oscillate. The sum total of effect is that the energy of the twisting crank is absorbed by friction between the clutch surfaces and the rapid oscillations are prevented. Something depends upon the strength of the clutch spring in the damper, as the little fly-



Section of Packard-Lanchester vibration damper as fitted to the twin six. The inner member is made in one piece with the oil throwing rings and the starting crank jaw

wheel rim must be sufficiently loose to be able to act as described, but not so loose that the friction will be too small to absorb the energy of torsion. The adjustment is not delicate and once the proper strength for the clutch spring has been found the damper can be made on a production basis and fitted complete without any further attention.

When first tried out the effect of the damper was amazing, turning a six-cylinder motor with a weak crankshaft and two bad vibration periods into a smooth and almost vibrationless engine. Broadly, it may be said that a 2-in. crankshaft with the damper is the equivalent of a 2 1/2-in. shaft without the device.

Packard Tries It Out

In developing the twin six the Packard Motor Car Co. tried a 2.125-in. crankshaft and found that there was a periodic vibration at a certain speed that could just be detected by an experienced engineer who watched for it, though the ordinary man would never have discovered it. It was not sufficient in force or in duration to warrant the use of a larger crank, so an experimental Lanchester damper was made up and fitted to an experimental chassis. The effect was entirely to remove the "period" and also it seemed to make the engine smoother than ever throughout the whole wide range of its speed. Accordingly the Packard company purchased the American rights of the invention.

Nine Possible S. A. E. Candidates for National Advisory Board

NEW YORK CITY, July 31—The members of the council of the Society of Automobile Engineers met to-day at the headquarters of the society for the purpose of selecting the two members of the society to serve upon the advisory board for national defense which is operating with Secretary of the Navy Daniels and will be headed by Thomas A. Edison. Although it was first thought that the council would directly appoint the members of this committee after a meeting lasting from 10 o'clock this morning until after 4 this afternoon, without recess, it has been decided to present the names of the candidates to the voting members of the society for a secret mail vote. There are nine of these candidates and they have been written for their consent, after which their names will be inscribed upon the ballots and forwarded to the voting membership. It has been aimed to expedite the selection, and to this end the prospective nominees have been asked to wire their acceptance. Immediately upon receipt of this the ballots will be sent out.

Analysis and Valuation of Motor Fuels —14 Methods of Examining Them

FROM GERMAN DATA

(Continued from last week)

ONE of the effects of mixing volatile and less volatile components may be noticed in the case of the mixture of 50 per cent gasoline and 50 per cent benzol. By figuring from the evaporation time for 100 per cent benzol, 2 hours 23 minutes, and that of pure gasoline, 57 minutes, the evaporation time for the 10 cubic centimeters of the mixture should be 1 hour 40 minutes, but the actual time, as given in the list, is 1 hour 56 minutes. The evaporation is not uniform, but the lighter component evaporates rapidly carrying with it a portion of the heavier component, and thereafter the remaining heavier portion evaporates slowly.

For this reason mixtures of very light and heavy components are not good motor fuels despite their relatively low specific gravity. [Compare for figures test No. 12.]

The following observation throws more light upon this rule. A light gasoline of .660 specific gravity and boiling point limits 45 and 80 degrees C., showed an evaporation period of 30 minutes, and a heavy gasoline of .750 specific gravity and boiling points 120 and 130 degrees showed a period of 7 hours. When these are mixed, producing a fluid of .700 specific gravity, every motorist will from this indication take the mixture to be a first-class gasoline. But its evaporation period is more than 5 hours, while the mean of the periods of its components would make only 3 hours 45 minutes. As gasoline of this order causes the motor to skip and leaves some of its least volatile portions in the carburetor [compare provisions made in some modern carburetors to drain off all liquid surplus or lead it to the point of strongest suction], the time test for evaporation gives a valuable clue to the dependability of the fuel for motor purposes. [The test might be expedited by having a definitely determined cold draft pass over the fluid or pumped against it from above, but not by raising the temperature of the air.

—ED.]

5. Behavior Toward Litmus

Gasoline or benzol can be tried for acidity with litmus paper. In the case of gasoline, it may also be shaken up with a mixture of litmus. Even after standing for some time no change in the coloration of the litmus should take place. Most gasolines are found to be neutral, but a few of the heavy gasolines show a faint acid reaction. The benzols show mostly a trace of alkaline reaction, but this may be due to a removal of pigment cells by solution, causing a faint bluish tint. Motor alcohol reacts with weak alkaline effect due to the pyridine used for denaturing it.

6. Color Reactions with Sulphuric Acid

A high-class cylinder with a ground stopper is first rinsed with sulphuric acid to remove all impurities, is then partly filled with the acid, whereafter the motor fuel is poured in and shaken up with the acid. When the two fluids have separated, the colors and actions of both are observed with a sheet of white paper for background. Where gasoline is bought according to specifications it is usually demanded of a high-class light gasoline that no change in coloration shall take place, while a yellowish coloring of the acid is permissible with heavy gasolines. The tables [of 92 fluids in the

German market; here omitted] show that even the best gasolines nearly always color the acid with a faint yellowish tint and that the heavy gasolines color it yellow to yellowish-brown. The demands should probably not be made more severe.

How it comes that some of the best gasolines lose in clearness by the test with sulphuric acid it has not been found possible to explain decisively.

For "90 per cent" benzols yellow coloration of the acid must also be accepted as admissible.

In the case of motor alcohol a marked rise of temperature with change of volume occurs at once through formation of ethyl ether, and any admixture of alcohol produces the same indications in lesser degree.

7. Benzol Test with Isatine-Sulphuric Acid

The sulphuric acid test just referred to shows in general if there are impurities due to unsaturated combinations of the order C_nH_{2n} and aromatic hydrocarbons. Quantitatively such impurities are shown, by Kraemer's and Boettcher's method, by weighing the amount absorbed in a mixture of 80 volumen per cent concentrated sulphuric acid and 20 volumen per cent fuming sulphuric acid. This process is applicable within the limits of 10 to 12 per cent of the impurities mentioned, but for larger percentages it is found [by Dr. Dieterich] that the sulphuric acid does not suffice for producing a quantitative transformation into sulphurous acids, and, as the amount of admixtures is not known in advance, the test can be only conditionally decisive.

Test 6 can be supplemented by adding isatine (.1 gram isatine to 30 grams sulphuric acid) to the mixture of gasoline and sulphuric acid, shaking the new mixture carefully and, after a short rest, observing the coloration. This done, the mixture is left standing 1 to 2 hours and the final coloration is then observed.

The object is to show the possible presence of thiophene which is a sulphurous impurity of benzol and with the isatine produces a pretty greenish-blue to midnight-blue coloration. But the test shows only thiophene with certainty and the benzol merely by an inference which is not quite safe, while benzol, on the other hand, is not shown if it is free from thiophene. It is due to this imperfection of the test that gasolines with strong benzol admixtures do not show the characteristic greenish-blue coloration but only greenish-violet or brownish shades. If the test is employed it is important to leave the isatine mixture standing for some length of time, as the true isatine coloring does not develop at once.

In practice the test can only be recommended when the purpose is to examine benzol for sulphurous impurities, especially thiophene.

8. Benzol Test by Nitration with Nitro-Sulphuric Acid

To isolate the nitro-combinations of benzol, the toluols and xylools, which constitute the aromatic hydrocarbon impurities of gasoline, the following process is employed.

Ten grains of the gasoline to be examined is mixed in a large retort with ten times as much of ice-cooled mixture of one part sulphuric acid and two parts crude nitric acid, and

the odor which is shortly noticed, if aromatic combinations are present, is tried for nitrobenzol, nitrotoluol, etc. With frequent stirring the mixture is left cold for one to two hours; thereafter it is heated slowly for several hours in a steam or hot-water bath and finally the retort is heated more strongly in an oblique position until the brownish-red vapors disappear and the mixture assumes a light yellow color. It is then allowed to cool, the odor is again examined and the mixture is diluted with an amount of water 10 to 15 times as large. When this has come to rest, it is observed whether larger or smaller amounts of light yellow or orange oily liquid or crystals are segregated. If a very violent reaction arises at the beginning of the mixing, with immediate boiling of the fluid, the presence of a readily nitratable substance, such as denatured alcohol, is indicated.

If the test fluid is free from aromatic hydrocarbons, no odor and no coloring occurs; neither does of course any isolation of a nitro-compound take place. Nitrobenzol shows the well known oily consistency and intense odor of bitter almond oil. If nitrotoluol is present, the nitration product (also the watery liquid) shows after a few minutes a brown coloring when treated cold with melted sodium hydroxide. If the nitration product is nitrotoluol only, it takes crystalline form, while preponderance of xylol is shown by dark yellow coloring.

By nitrating once in the manner described, the benzol is mainly turned into nitrobenzol, $C_6H_5NO_2$, and the toluol forms, aside from small quantities of the meta [isomeric] combination, both the ortho and the para modification. Of these only the latter is crystalline, in long light yellow needles. The nitrotoluol, $C_6H_4CH_3NO_2$, does not smell of bitter almonds but has a special nitrous odor. Nitroxylol has a similar odor and is an oily liquid resembling in color the yolk of an egg. By the cold treatment with sodium hydroxide the nitrotoluol gives, as mentioned, a brown coloring, but this becomes blood red if nitroxylol is present in considerable quantity, especially by heating. Nitrobenzol remains perfectly unaffected by this test.

A quantitative determination of the nitrated products by means of ether has been repeatedly proposed, but is uncertain by reason of the high volatility of the ether and dangerous on account of the poisonous vapors. Giving products varying in quantity and composition it has not been found useful.

Very little information is found in technical literature with regard to the amount of aromatic hydrocarbons contained in the commercial gasolines. The chemical testing bureau of the city of Dresden notes, however, that three samples each showed 10 per cent of benzol. The present series of examinations has shown that even the best gasolines of Class A can contain small percentages of benzol and that those of class B almost without exception contain aromatic ingredients, while the heavy gasolines may not show benzol but always toluol and xylol and usually some unsaturated (olefine, C_nH_{2n}) combinations. When a large number of gasolines are tested at the same time, the colors and segregations alone indicate plainly enough the motor fuel values of the different fluids.

The fact that most of the motor gasolines in the market now contain aromatic hydrocarbons shows that the raw materials, the petroleums from which they are distilled, have undergone a change. To ask that a motor gasoline shall be quite free from benzol is therefore to go too far. A small and natural percentage of the aromatic hydrocarbons does no more harm in gasolines than in benzol, and is unobjectionable if the price is in accordance with the amount of these irregular components which to some degree indicate how far refinement has been carried in the manufacture of the fuel. [The indication is uncertain unless the composition of the raw petroleum used in the production is known.]

What quota of aromatic hydrocarbons should be allowed in

each of the three classes of gasoline is a question referred to under No. 9.

9. Test with "Dracorubin" Paper

For distinguishing gasoline and benzol the use of iodine is well known. Dissolved in gasoline it becomes raspberry red, in benzol violet and in alcohol (making tincture of iodine) brown. But it is not suited to show an admixture of benzol in gasoline, as the colorations become too indefinite.

HOLDE's test depends on the use of a specially treated asphaltum which affects gasoline very little but is solved in benzol with dark coloration. It shows benzol in gasoline, but the production of the asphaltum directly from petroleum and the leaching of it in different fractions of the gasoline are rather complicated processes. A more suitable substance has been found [by Dr. Dieterich] in the gum of the dragontree of Sumatra. The sap of this tree, as obtained by incisions, is called dragonblood and is a resin containing a red gum which is isolated by hot treatment of the resin with petroleum ether. The pure gum is thereafter insoluble in petroleum ether and in the form of a red powder which has been shown to be an ester of benzoic acid [a *Dracoresinonannolester*, Dr. Dieterich terms it]. This pure gum yields somewhat to hot gasoline but leaves only traces in cold gasoline, while in alcohol and benzol it is at once dissolved with magnificent blood red coloration. To produce this gum of dragonblood so pure that it gives up nothing whatever to cold gasoline of any of the three classes but immediately reacts to traces of benzol, 10 kilograms of dragonblood (of the best grade which comes packed in bast) was dissolved in 25 kilograms of petroleum ether, the residuum was again lixiviated in 15 kilograms of ether and from this solution the dragonblood-alban ($C_{10}H_{16}O$) was precipitated with 25 kilograms of absolute alcohol. The filtrate, after being steamed off, was boiled in 30 kilograms of petroleum ether and successively in hot petroleum, hot benzene and, finally, hot light gasoline. Some of the gum goes into the solvents, but after the last boiling the gum remains unaffected and insoluble in gasoline. The red gum powder obtained in this manner is what is termed "Dracorubin." It is eminently adapted for demonstrating the presence of benzol in gasoline, and *vice versa*, and also for determining the values of different gasolines, benzols and motor alcohols.

This product has been placed in the market in the form of a reaction paper which is made by solving 2 kilograms of dracorubin in 8 kilograms of benzol and soaking filter paper twice in the solution. When dried the dracorubin paper is dark red and waxy in appearance. It is sold in packages containing 80 strips each at the Helfenberg Chemical Works Co. (at Helfenberg, Saxony, Germany). It is employed as follows:

Four strips of the paper are placed in a high clear and uncolored glass cylinder with stopper and the motor fuel is poured in till the papers are immersed. This is left standing, well stoppered, in ordinary indoor temperature till the next day. After shaking the cylinder, one removes the papers, and places a sheet of white paper under and behind the cylinder. For comparison a second cylinder is filled with ordinary gasoline. Two observations are now made, one relating to the color of the fluid and the other to the color of the four strips of paper after they have been dried. [Dr. Dieterich gives here a table showing the reactions with 33 fluids of interest in the chemistry of motor fuels, their impurities and adulterations. With regard to the sensitiveness and general usefulness of the paper, it is noted, for example, that the reactions for American, French and German turpentine are markedly different, indicating that this new testing preparation might be found of use in the paint industry as well as for detecting variations in the quality of motor fuels.]

In general, the results of tests of motor fuels with dracorubin paper are indicated in the following table:

REACTIONS OF DRACORUBIN PAPER

Color of Fluid	Color of Paper	Nature of the Fuel
No color; at most faint rose pink sheen.	The dark red paper unchanged, when dried.	Class A gasoline, free from benzol and aromatic hydrocarbons; at most traces of these.
Rose pink to light red.	Red.	Gasolines of class B or C or mixtures of gasoline and benzol or Class A gasoline with admixture of class C gasoline, containing benzol.
Pink with yellowish tint.	Lighter red than before used.	Class C gasoline with little benzol, but much toluol; high specific gravity.
Light red to dark red.	Red to light red, finely mottled.	Mixtures of gasoline and benzol or gasoline with strong natural benzol content.
Dard blood red.	Pale mat tile, finely mottled.	Good "90 per cent" benzol.
Dark brownish red.	Dark splotches on tile red.	Heavy benzol with toluol and xylol or heavy gasoline with toluol, but little benzol.
Dark blood red. Blood red.	Light rose pink. Rose pink.	Denatured 95% motor alcohol. Denatured 90% alcohol.

To use the dracorubin test for an approximately quantitative determination of benzol in gasoline, the best method is to add 10, 20, 30, 40 per cent or more of benzol to normal gasoline ["normal" gasoline can be obtained in Germany tested by the Royal Bureau for the Testing of Materials at Berlin Lichterfelde and corresponding to close specifications, such as: Specific gravity .695 to .705, boiling limits 65 and 95 degrees C., free from benzol, does not color sulphuric acid], place dracorubin paper in these samples, and compare the different shades obtained with the color of the fuel under examination. Air and light gradually affect the colorations, however, and the sample solutions should therefore be renewed from time to time.

From the many dracorubin tests made it has become evident that nowadays even the finest gasolines contain small percentages of benzol, and it can be inferred from this fact that more petroleums containing benzol are being refined now than formerly; also that refinement of the gasolines is in part less thorough than in the earlier years of the automobile movement.

10. Nitrate of Silver Test

Adulteration of gasoline with volatile components of coal tar oils or lignite tar oils, which always contain sulphurous substances, is detected by the nitrate of silver test. Five cubic centimeters of the gasoline is mixed with one-fourth of this volume of alcoholic solution of ammonia and a few drops of nitrate of silver solution. Placed in a long test tube, this is dipped a few times in hot water and it is observed whether a brownish coloration occurs or not. With gasoline of class A there should be no such reaction, with those of class B a light coloration is admissible and with class C a light blackening. Benzols all show blackening, as they naturally contain sulphur combinations.

11. Calcium Carbide Test for Water

Any considerable quantity of water in gasoline or benzol collects in drops which can be seen without difficulty at the bottom of perfectly clear glass bottles and still easier in dark bottles. While neither of the fluids is miscible with water, both can absorb a certain amount of moisture, especially benzol. (Bright iron parts rust more readily in benzol than in gasoline.) To distribute whatever water may be contained in the fluid under test and thereby make sure of getting it in contact with the carbide, the fluid is first carefully shaken. A couple of pieces of perfectly dry calcium carbide

are then added, and one observes by the odor if only air bubbles are the result or a strong development of acetylene occurs.

Motor alcohol of the 95 per cent grade gives scarcely any acetylene, while cooking-alcohol of 90 per cent gives a very strong development.

12. Fractional Distillation

While for commercial distillation it is important to determine the whole curve of boiling points of a fluid, the matter of most direct interest for judging motor fuels is to ascertain how much of the fluid in each case evaporates below 100 degrees C. and how much requires a higher temperature. To make sure of the figures on this point some departures from the usual methods were made in this series of examinations. The quantity of the test material was made larger, 250 grams being used in each case, and volume measurements were discarded in favor of weights. To get exactly the percentages passing over below 100 degrees C., the following method was followed.

In a calibrated fractional distillation retort holding 500 grams and made of Jena utensil glass (*Jenaer Geräglas*) 250 grams of the motor fuel was weighed in, glass beads and a couple of glass capillaries being added to promote boiling, and was heated on the wire net over a small flame. The retort was also protected by wire caging at the sides and above, for security in case of breakage and fire. Without considering the momentary barometric pressure, the lower boiling point was taken as that thermometrical degree at which the first drop of distillate trickled from the lower end of the condenser to the receiver. The distillation was continued till the thermometer showed 85 to 90 degrees C. Then the retort was imbedded as deeply as possible—up to the point where the distillation tube branches off—in a chloride of calcium water bath arranged to have a boiling point of 110 degrees C., and with this bath held exactly at 100 degrees the distillation was continued so long as anything passed over. (About 66 to 67 per cent of crystalline $CaCl_2 + H_2O$, or else 34 per cent of melted $CaCl_2$ in a solution of 1.3124 specific gravity makes the required bath.)

By switching the chloride of calcium bath into the process it is possible to hold the temperature more exactly constant at 100 degrees than with the customary continuous distillation, and certain errors are thereby avoided, especially in the case of the heavy gasolines.

After cooling of the retort the weights were determined and thereafter the process was continued with direct flame above 100 degrees until the retort was empty or only filled with vapor. At this moment the second boiling point was noted. Each of the two fractions was kept and served subsequently for the optical test, No. 13.

Barometer readings were recorded for each test but no allowances for the variations were figured.

The usual conception of gasoline comprises those components of petroleum which boil below 150 degrees C. But it is seen from the detail tables [here omitted] that the actual motor gasolines of the present day go far beyond this limit. And as petroleum ether, with boiling points 28 and 40 degrees, does not come into the question for motor fuel purposes (being applicable only as an admixture to benzols, to increase the velocity of flame propagation), the motor gasolines can now be taken as including the distillation products from about 45 to 160 or 170 degrees C. Contemporary technical literature [HEFTER, HOLDE and UBBELOHDE are the authors mentioned] gives the boiling limits for first-class gasoline as 80 and 110 or 120 degrees, but it is apparent from the present series of analyses that motor gasolines must have wider limits in order to be recommendable. The best class A gasolines show boiling limits of about 45 and 110 degrees, and in accordance herewith it is especially the lower limit which must be drawn back to 40 degrees. A gasoline

(Continued on page 267)

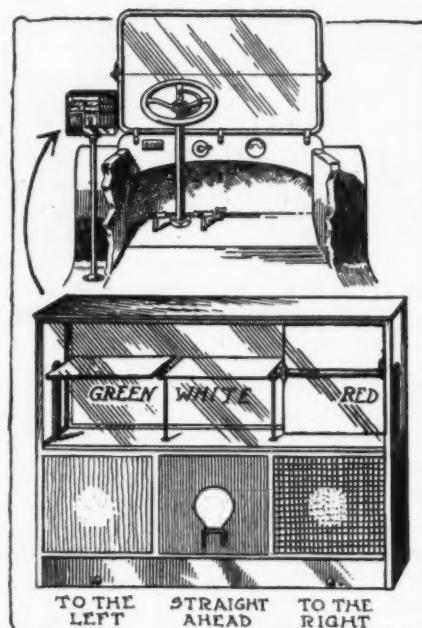
Accessories

Perfection Car Heater

THE Perfection heater which radiates exhaust heat utilizes energy which otherwise is wasted and operates entirely without maintenance cost. A small valve on the exhaust pipe deflects about one-eighth of the hot burnt gases through a flexible steel hose to the heater where it warms the air in the car which circulates around the hot copper tubes of the heater. The heater is made in two types, one for passenger car use and the other for commercial vehicles. The passenger car type consists of a series of seamless copper tubes assembled into a manifold at each end, these radiating parts being carried in a rust-proof under-casing. The 9½ by 13½ in. top plate which is mounted flush with the car floor is buffed and polished. The heater is 2½ in. deep and provides over 200 sq. in. of radiating space. A small lever projecting through the floor plate provides regulation of the amount of heat taken from the exhaust pipe. The second type of heater occupies only 3½ by 15½ in. of floor space and is constructed in the same way as a passenger car heater except that the heat control lever is made as a separate unit and can be located wherever desired.—Perfection Spring Service Co., Cleveland, Ohio.

Electric Direction Signal

An electric signaling device to indicate the direction an automobile is going at street intersections has a double-deck arrangement, with flag and lantern effect, and is attached on the left side of the car near the edge of the windshield in such a manner that it can be seen easily from both front and rear. Green, white and red squares of glass are thrown to an upright position in the upper portion for the respective signals desired, and



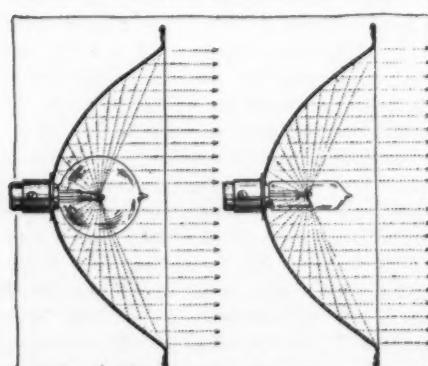
Above—Sherman-Crane electric signalling device mounted on running board of a car.
Below—Section through the device

lights of the same color are flashed in the lower part, thus making the invention suitable for use in both daylight and darkness. It is also equipped for having the horn sounded whenever the button is pressed for any signal. It is made of a metal frame, with glass sides, and is attached to the running board by a piece of ¼-in. iron pipe and flanges.

Green, the left or outside color, means a turn to the left; white, the middle color, means straight ahead; red, the color next to the car, means a turn to the right; while a combination of either side color with the middle color means a turn around in the direction of the respective green or red of the combination, all three are flashed together for stopping and the red and green are shown together for backing up. Signals are visible from any direction. The device sells for \$15.—Sherman-Crane Automobile & Signal Co., Denver, Col.

Argon Headlight Bulbs

A new type of headlight bulb is the Argon which is filled with nitrogen gas, put into it by pressure. This gas contains a small percentage of argon, about 2 per cent, which, the maker claims permits the use of a higher voltage for a given filament. The filament is of drawn tungsten wire and is so coiled that when properly focused the lamp does not produce dark rings.



How the Argon headlight bulb obviates obstruction of the reflected rays

The bulb, which is elongated, will pass through the opening in practically any reflector and the bulb can be put in place from the back. Obstruction of the reflected rays from the part of the reflector nearest the center is obviated by the form of the bulb.

Another Argon type has a double filament, the main filament being for full lighting and the supplementary filament, which is placed back in the base so that it does not cast any rays on the reflector. This is especially adaptable for city use.

The candlepowers of the regular type Argon tubular bulbs are from 16 to 24 and the voltages are 6, 7, 8, 9, 12 and 18. Price, \$1 each.—Wood Mfg. Co., Fairfield, Conn.

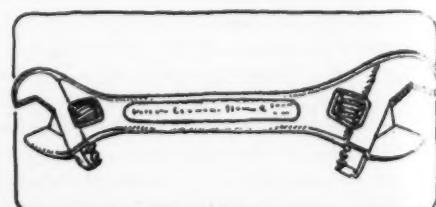
Noncarbene Fuel Improver

Noncarbene is a preparation designed to remove carbon from the cylinders and to keep this part of the engine always in efficient condition by its lubricating and cleansing action when mixed with the gasoline in the fuel tank. It is also claimed to increase the power of the motor and to effect a considerable economy by increasing the mileage per gallon of fuel. Noncarbene comes as a liquid in cans, together with complete directions for mixing with gasoline and a small metal cup measure for insuring the proper proportion, which is a ratio of ½ pint to 4 gal. of gasoline. It sells for 50 cents a quart, \$1.50 a gal., \$6.25 for 5 gal., \$12 for 10 gal. and \$50 for 50-gal. barrel. There is also a Tourist Package of sixteen half-pint cans for \$2.—The Noncarbene Co., New York City.

Automobile Wiring Harness

A wire harness for the purpose of protecting the electric circuits from oil, water, grease, dirt, etc. which are apt to cause power leaks and short circuits has recently been brought out by the Breeze company. The wires are housed in the Breeze flexible metal wiring cover which acts as the armoring agent. This harness comes in a complete outfit containing sufficient material to cover all the wires to lamps, generators, batteries, starter, spark plugs, magnetos, dash equipment, etc., and the wires from different directions which come together in two-to-one and three-to-one joints at a common center can be readily drawn through the conduit.

Any number or lengths of wire can be used. The armor for the rear lamp is



Crescent wrench with 22 1/2 deg. adjustable head at each end

black enamel for 3 feet, that for the front lamps is nickel-plated brass for 6 feet. The average total length needed for the largest cars is about 30 feet, but the outfit as put up comprises 45 feet of the covering, four two-to-one joints, two three-to-one joints, 20 feet of 5-16-inch inside diameter flexible wiring covering, 10 feet of 7-16-inch; 8 feet of 5-8-inch and 7 feet of 1-inch. The price of the outfit is \$6.—Breeze Carburetor Co., Newark, N. J.

Double-End Adjustable Wrench

A double-ended and adjustable wrench, modeled after the solid engineer's wrench, is the latest Crescent model. A single-ended adjustable wrench is also produced. The adjustment is obtained by means of a screw and rack bar.

Two sizes are made: one has heads for 15/16 and 1 1/8 nuts and the other 5/8 and 15/16 nuts. The double ended pattern weighs but an ounce more than the single end tool of the larger size. Price, small size, polished, \$1.25 each, \$15 per dozen; nickelized, \$1.60 each, \$19.20 per dozen. Large size, polished, \$1.50 each, \$18 per dozen; nickelized, \$1.90 each, \$22.80 per dozen.—Crescent Tool Co., Jamestown, N. Y.

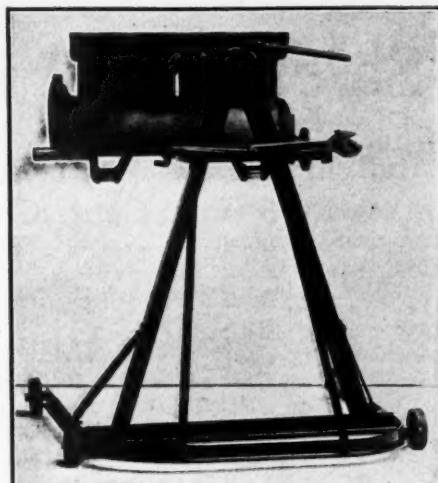
Ekern's Ford Products

A special stand for Ford motors is of great assistance in repair shops. The Ekern stand carries the motor attached to the stand by two bolts which screw into the sides where the water connections are bolted on when the motor is mounted in the car. The clamp and motor can be rotated together to any position and secured there by means of a split clamp. The stand is provided with small wheels which render it easy to move it around the shop. A tray on the stand holds tools and small parts which may be taken off the motor. The stand is 34 in. in height and takes up floor space 32 by 30 in. It weighs 50 lb. and sells for \$20.

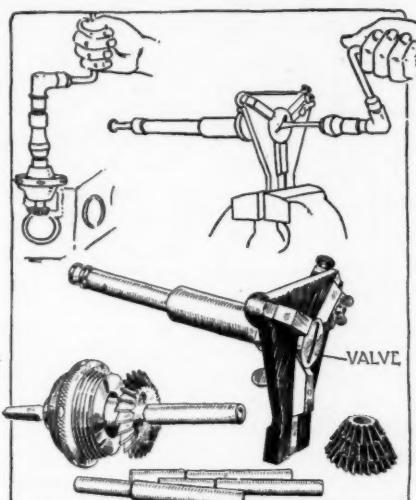
Another Ekern product is an attachment which renders it possible to tow in a Ford car with a broken axle drive shaft on its own four wheels. A frame carrying a stub axle is hooked on the housing flange at the bottom and held in place by tightening a set-screw at the top. The broken end of the shaft is removed from the wheel hub and the wheel slipped on the stub of the attachment. The car can then be towed in as well as if the axle were intact. The attachment weighs 6 lb. and sells for \$5.—Ekern Bros., Flandreau, S. D.

Healy Valve Tools

For refacing valves and valve seats a complete set of tools is put out by the Healy organization. The valve tool consists of a frame plate carrying three adjustable cutters with a guide extension to take the valve stem and hold it steady.



Ekern stand which permits mounting of Ford motor in any position



Healy set of tools for refacing valves and valve seats of any size



Stewart single-cylinder tire pump. The piston is fitted with one large ring and a unit of five small rings. The pump is furnished complete with fittings for any car at \$15

The tool is held in the vise and the valves turned with a brace. There is an interior chuck which closes on the valve so that it cannot chatter while turning and an adjustable bearing takes the end thrust. Both are adjustable.

The cutters are 45 deg. at one end and 60 deg. at the other, being adjusted by means of a micrometer screw. The seating cutters, of milling cutter type, have from sixteen to twenty-four teeth, according to size, and are so constructed that a cutter 1/4 in. larger than the valve will enter the port; the large size permitting the removal of shoulders. The guides are of hardened steel set in a taper. With the port steadyrest having a running thread on a taper which will allow for any size port. The cutter is held in alignment by six ball bearings. The price is \$35. For a special Ford set the price is \$10.—Healy Tool & Appliance Co., Buffalo, N. Y.

Stewart Tire Pump

The improvements in the Stewart single-cylinder tire pump were described in these columns last week, but through an error the illustration appearing with this article was not that of the Stewart pump, which is reproduced in its improved form herewith.

Chicago Flexible Tubing

A comparatively new product is the Everlasting gasoline hose, which is built up of no less than eight layers. The inner lining is of flexible steel, over which is a layer of fiber, then a layer of braid, one of a special gasoline-resisting composition, another braid, then a second gasoline-proof coating, a third braid and finally the waterproof outer jacket, which is woven on. No rubber is used. Other products include hot air hose for carburetor connections, oil, air and steam tubing, acetylene tubing and connectors, etc.—The Chicago Tubing & Braiding Co., Chicago, Ill.

Coronum Metal Cement

To stop leaks in pipe connections, radiators, boilers, heaters, flanges, etc., Coronum metal cement has been introduced. This cement can be successfully applied without experience by following the directions printed on the cans and is claimed to repair any leak and harden thoroughly within 30 minutes. It is put up for the trade in 1, 5, 10 and 25-lb. packages with the necessary liquid for making the mixture.

It is not affected by vibration and is tested to 500 lb. hydraulic pressure to the sq. in.; on live steam to 250 lb.; on gasoline to 200 lb.; and on hot oil to 500 deg. To repair a hole or small leak in a pipe, fill up the hole or leaking part with a mixture of the cement as thick as putty. Price per pound, \$1, including can of cement and can of liquid.—Coronum Equipment Co., New York City.

Los Angeles Sales Gain 117½ Per Cent

Maximum Increase of Individual Dealers' Business Over First Half of 1914 Is 5.38 Per Cent, with 5 Per Cent Gain as the Minimum

By A. G. Waddell

LOS ANGELES, CAL., July 30—An increase of 117½ per cent in the volume of business done from Jan. 1 to July 15 of this year over the same period of 1914 is reported by the motor car dealers of Los Angeles. The minimum increase of the Los Angeles dealer is slightly under 5 per cent. The maximum increase for the period is 538 per cent.

In estimating the increase in the volume of automobile business, fifty-five different makes, forty-six of which are pleasure cars, were used as a basis for the figures. The nine commercial cars figured separately, show an increase of 135½ per cent, which proves the claim to prosperity made by practically all lines of wholesale and retail trade in southern California. But the gain in the sale of pleasure cars is of the greatest importance. This remarkable gain in pleasure car sales represents \$10,000,000 since Jan. 1.

47,000 Cars in Los Angeles County

Los Angeles county owns 33½ per cent of the cars and commercial vehicles registered in the State of California. There is an increase of 4758 cars in Los Angeles county for the first 6 months of 1915 over the first 6 months of 1914, which is a gain of 48 per cent. There are approximately 47,000 automobiles owned in Los Angeles county to-day.

In California, during the first 6 months of 1915, 137,500 cars were registered. This shows a gain for the entire State of almost 50 per cent.

There is not one county in Southern California which has not gained from 30 to 80 per cent.

Control Southern California and Arizona

The Los Angeles automobile dealers control most of the Southern California and Arizona territory, with sub-agents representing them in the cities and larger suburban towns.

The Chevrolet branch here sold more cars at retail last month than in the whole first six months of 1914. In June, 1915, sixty-four Chevrolet models were sold at retail by the Los Angeles branch of the Pacific Coast agency. With 1200 cars contracted for 264 have been sold out of the local house during 1915 against forty cars delivered during the same months of 1914.

The Overland shows an increase of 77 per cent over last year's business to July 15. The J. W. Leavitt Co. branch here has sold and delivered 1172 cars this year.

The Winton Motor Car Co. shows an increase of 50 per cent for the Los Angeles factory branch.

The Chandler agency shows an increase of 108 per cent which represents \$225,000 in sales.

An increase of 37 per cent has been made by Don Lee, Cadillac and Paige dealer. This is a gain which is expressed as \$280,000 on the books of the agency.

A remarkable gain of 112 per cent is shown by Lord Motor Car Co., Maxwell dealer, which has all of Southern California and Arizona. Both the National and Oakland sales of Hawley, King & Co. have increased 35 per cent.

The Peerless and Premier being handled by the same firm, Smith Bros., the figures of the two makes are together and an increase of eighty-one cars for 1915 over the 1914 period

gives a percentage as ninety-eight in the increase column.

For the Bekins-Spears Motor Co., Haynes dealer, the gain has been 101 per cent.

The Beardsley Electric Co.'s books show a gain in sales of 60 per cent and the Benrich Motor Co., Moline dealer, has a gain of 50 per cent.

The Apperson Motor Car Co. sold and delivered fifty-four cars in the period last year, and up to July 15 of this year 151 cars had been sold. The Apperson's territory has just been increased to embrace the three States, California, Arizona and Nevada and for the past thirty days the salesmen have been taking orders only, as no cars were to be had for delivery.

One of the chief difficulties of the Los Angeles automobile man is the scarcity of cars. The demand greatly exceeds the supply. On the sales floors of many of the largest houses in this city, there is but one show car and some dealers have sold even their show cars and demonstrators.

For some of the early season models owners have paid bonus prices and for one car delivered among the first of the 1916 arrivals, \$350 was added to the original price as the dealer wished to retain the car for a demonstrator.

F. R. Cryiacks, Buick dealer, now has more than 800 orders on file and cars are coming through from the factory at Flint, Mich., in four, five and six-car-load lots every day or so; but the orders continue to roll in ahead of the deliveries.

The Cole Motor Co. shows an increase of 65 per cent but the increase would have been greater had the agency been able to deliver the cars. Four car-loads arrived here July 19 and there was but the one demonstrator at the agency the next afternoon. There is almost a motor car panic on in Los Angeles to-day.

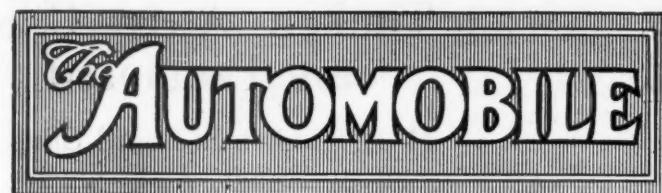
Great Gain in Truck Business

Among the truck agencies showing a great increase in business during the early months of 1915 is the local Moreland factory. This concern has doubled its business twice during the past year and the capacity of the plant is now being enlarged to accommodate a 100 per cent increase in business. The month of June, 1915, was the greatest month of the Moreland plant. During the month there were fifty-seven trucks built and delivered.

For the periods of the two years, the Mack Motor Truck Co., agents for Mack, Saurer and Republic trucks, shows an increase of 133½ per cent.

The Commerce truck has increased the truck total for Los Angeles this year. H. G. Pendell, local distributor, has an increase of 150 per cent to his credit but this cannot be taken into consideration in the general average as he did not have the agency during the first months of 1914.

White deliveries have not increased at the same rate as other makes but in volume of business the White shows a 50 per cent gain with a business here as solid as a national bank. Kissel and Federal have a joint increase of 47 per cent which means a great deal for such heavy sellers in this territory. The Kelly-Springfield has an increase of 71 per cent this year which is due to a steadily advancing demand for commercial vehicles of the type in Southern California.



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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Determining What's What

IT needs a gathering of service men and a few hours' talk to understand how many pieces of an automobile can be called by half a dozen names or more. It needs a discussion to show how many reasons there are why each name is the best from a particular automobile manufacturer's viewpoint, and, one may add, it needs some very progressive men to make as much progress as was made by the informal nomenclature meeting held in Detroit last week.

There is a sufficient similarity between each detail of any one automobile chassis and any other to make possible the use of the same name for the same part, or for the part which does the same work. To settle on one name and discard a dozen alternatives means time and concentrated effort by those intimately interested, but if twenty men gave six months entirely to the subject their aggregate labor would be less than that which is wasted in a week by the thousands of people who handle replacement parts.

The nomenclature work of the S. A. E. has not made the progress it might have made, on account of the tremendous difficulty of the subject, but the new scheme of working should clear the matter up quickly. We look forward to an early future in which the chaotic terminology of the present will be replaced by the most complete and perfect technical language possessed by any industry.

Provoking Invention

WHEN the Knight sleeve-valve motor was first taken up and standardized by a British maker it provoked a tremendous boom in invention and experiment with gasoline engines having sleeve, piston or rotary valves. It is safe to predict that the adoption of the Knight motor for a car which will be produced in large quantities is sure to have a similar effect. The stimulus to inventive thought created by the Knight motor's first appearance as a European product spread all over the mechanical world, and was not confined to Europe, by any means; so there are many half-developed ideas lying dormant in America which have never been exploited or even tried out.

A boom in any sort of invention is usually productive of a few excellent things, even though the mass of boom inventions are utterly worthless; so it seems likely that a re-awakened interest in motor valve systems may lead some of the languishing ideas to be resuscitated. With the valve situation so shaken up as it has been by the success of multi-valve racing motors the whole subject is ripe for renewed experiment. We know much more about materials and about lubrication than we did in 1906, and it is possible that some good motors which were impracticable then would be satisfactory now.

Useless Metal

WHAT man would try to ride a bicycle weighing 100 lb.?

Surely, only a crazy man, and yet many a gasoline motor is being asked to do something equally absurd. The motor does it because it is strong enough, but it does it only at the cost of more fuel, oil and tires than would be used to carry a lighter load. Carrying on the bicycle analogy, the vehicle here weighs less than one-fifth as much as the load it carries. The automobile, on the other hand, weighs more nearly five times as much as the load.

Of course, the cases are different, as the automobile load does not supply its own power, but the fact remains that only one-fifth of the power of an automobile engine is available for the transport of the passengers, the other four-fifths goes to the transport of the car itself. Surely four-fifths is a very large fraction?

The automobile has been given reliability and a wonderful flexibility of power that is best called roadability. Throughout its development the word efficiency has been used loosely with reference to all sorts of things, but we have now reached the stage where the only real efficiency may be studied. Real efficiency in the broadest sense means work done by comparison with cost of doing it, and the first step along the road of progress is to cut out some of that four-fifths of dead metal. It is no impossibility; merely it means the use of more suitable materials and a better proportioning of stresses throughout the structure as a whole. Let every part help to carry itself instead of having some other part to bear its weight.

Overland Forced to Expand

To Add 23 Acres of Floorspace
—New Office Building
—Orders Plentiful

TOLEDO, OHIO, Aug. 2—Additions more than equaling the size of the average American automobile plant are being started at the Overland factory here. According to officials of the company, the additions to the factory alone will be equivalent to almost 23 acres of floorspace. In addition to the factory extensions, there will be a new office building 63 by 373 ft.

One of the new factory structures will contain 20 acres of floorspace and will be nearly three times the size of the original Pope plant, when taken over by John N. Willys, president of the Willys-Overland company. This building will be five stories high, 400 ft. wide and 400 ft. deep. It will be used for final testing, body assembling and finishing and will contain 800,000 sq. ft.

The enameling department will have an extension put on it containing 3500 sq. ft. of floorspace.

The pattern shop will be enlarged by a three story, fireproof addition, 83 ft. wide by 100 ft. long. This new building will add 25,000 sq. ft. of floorspace to the department. The dry kiln building will be increased in size by a two story, fireproof extension 145 ft. by 107 ft. containing 31,000 sq. ft. of floorspace.

The original Pope buildings facing Central Avenue will be rebuilt and enlarged by 53,000 sq. ft. of floorspace. They will be made fireproof throughout.

The old wooden buildings will give way to a new administration building. The plans call for a seven story fireproof structure, made of steel and tile throughout and containing 165,000 sq. ft.

Although the production of the Overland company is larger than ever before in its history, and is steadily increasing, the factory finds it impossible to gain on the orders pouring in from all sections of the country.

McDuffee Overland Sales Mgr.

TOLEDO, OHIO, July 31—Joseph H. McDuffee, who was recently put in charge of the Willys-Knight division of the Willys-Overland Co., has been appointed assistant sales manager of the entire organization.

Richman Cole Factory Manager

INDIANAPOLIS, IND., Aug. 2—J. F. Richman, formerly factory production manager of the Cole Motor Car Co., has been promoted to factory manager.

Mr. Richman has been with the Cole company for almost three years, coming from the Hudson Motor Car Co. after being with that concern for four years. Previous to that time he was with the Oscar Lear Co., Springfield, Ohio, since changed to the Kelly-Springfield Motor Truck Co. Prior to that time he was connected with the Oldsmobile company for a number of years.

S. A. E. Standards Committee Meeting Scheduled for Oct. 14

NEW YORK CITY, Aug. 3—The date for the standards committee meeting which, as has been announced in THE AUTOMOBILE, will be held in Chicago, has been set for Thursday, Oct. 14. The meeting will occupy but one day and will be in the nature of a convention, as members of the society from all over the country will be in attendance. All members of the society are welcome to these meetings and this one will be of particular interest to those around Chicago as it will probably mark the introduction of a Chicago section of the Society which will have its own meeting place and officers.

Paterson Has New Six

DETROIT, MICH., Aug. 4—*Special Telegram*—The W. A. Paterson Co., Flint, Mich., is bringing out a new light six at \$985 for the five-passenger and \$1,060 for the seven-passenger model.

The motor is a Continental, 3 1/4 by 4 1/4 in. Wheelbase is 117 in. and tires are 32 by 4. The carburetor is a Stromberg.

The four-cylinder model will be continued and is the same, except in minor details. The price of this car is reduced from \$1,095 to \$985.

Grant Brings Out New Six

FINDLAY, OHIO, Aug. 2—The Grant Motor Co. has brought out what is known as model TT Grant six. It is not a 1916 model but rather a summer series model. The only difference between the TT and the T model is that the former has a motor with 3 in. bore while the latter has 2 1/2 in. bore. In the model T a Mayer carburetor was used, but the TT has a Rayfield. In other constructional or equipment features the two cars are alike and the price also is the same.

Rumely Co. to Enter Small Tractor Field After Reorganization

SOUTH BEND, IND., July 31—It has been announced by J. W. Toone, treasurer of the M. Rumely Co. of Laporte, that after the reorganization of the company it will enter the small tractor field, and Mr. Toone also took occasion to deny the rumor that Henry Ford of Detroit was negotiating for the Rumely oil pull plant.

Timken Axle Officers Promoted

H. H. Timken Is Board Chairman—Alden and Lewis Vice-Presidents

DETROIT, MICH., Aug. 2—Promotions and changes have taken place at the Timken-Detroit Axle Co. recently, among the officers. Former Vice-President H. H. Timken has been appointed chairman of the board; W. R. Timken remains president of the company; A. R. Demory, production manager; H. V. Alden, chief engineer and Eugene Lewis, formerly secretary-treasurer, are appointed vice-presidents, and Mr. Lewis is also made general manager. Assistant Treasurer C. W. Dickerson is now treasurer; F. C. Gilbert, who was assistant secretary and sales manager, is promoted to be secretary and retains his other title; W. H. H. Hutton, Jr., who was purchasing agent, director of purchasing.

E. B. Lausier, who represented the Timken-Detroit Axle Co. in the East has resigned and George L. Bitting, who formerly traveled the central States, has taken his place. He has his headquarters in Buffalo and covers the territory including Cleveland, New York and Eastern Canada.

P. W. Hood, with headquarters in Chicago and Detroit, continues to represent the Timken-Detroit Axle Co. and the Timken Roller Bearing Co. in the West, but in addition he will represent the Timken-Detroit Axle Co. in Southern Michigan.

Harry J. Porter, Detroit, formerly representing both Timken companies in Southern Michigan now represents the Timken Roller Bearing Co. in that territory, Ohio, Indiana and the South.

C. E. Gordon, Indianapolis, formerly representing the two Timken concerns in the Central West now represents the Timken-Detroit Axle Co. only, with headquarters in Toledo, Ohio.

Willems Off to Antipodes

DETROIT, MICH., Aug. 2—E. G. Willems, foreign district representative of Dodge Bros. will start shortly on his second extensive foreign tour which will extend over a period of at least six months. Sailing from San Francisco Mr. Willems will first go to the Hawaiian Islands, then to Australia, New Zealand and other countries in that vicinity.

Kiser Chalmers General Auditor

DETROIT, MICH., Aug. 2—William P. Kiser, formerly secretary of National Cash Register Co., Dayton, Ohio, has been appointed general auditor of the newly organized general auditing department of the Chalmers Motor Co.

Foreign Field for Parts Makers

Maxwell Export Representative Says Europeans Are Taking to Assembly

DETROIT, MICH., Aug. 2—J. B. Crockett, export representative for the Maxwell Motor Co. in the Orient, and who also represents some British motor car manufacturers, has returned after having spent some time in Europe trying to interest manufacturers abroad in American chassis parts, motors, transmissions, axles, etc.

The American method of purchasing components from parts makers and then assembling cars has never met with much success in Europe until the present war. Owing to the exceedingly great need of motor cars some of the leading British car makers have decided to try the American idea and if these manufacturers are successful in their experience with American parts, it is thought that a big and new field will thus be open for the American parts makers.

At the present time there is no credit consideration and the purchases made by Mr. Crockett are paid for in New York. One of the principal things which the American manufacturers must bear in mind in order to get the business and give satisfaction, is to make deliveries as promised and also to adapting their products as far as that is possible to the foreign requirements. The matter of keeping up with promises of deliveries is all important. Manufacturers interested may communicate with THE AUTOMOBILE.

Olds Foreign Trade Department

LANSING, MICH., July 29—No special effort has been made thus far by the Olds Motor Works to get foreign business owing to the demand by American dealers who have always taken practically the entire annual output. Since the beginning of the European war automobile dealers in foreign countries have inquired so often, and a good many have even come to the factory to try and secure agencies, that the Lansing concern has decided to reserve part of its production hereafter for foreign markets. A special foreign sales department has been established for that purpose. It is in charge of W. von Zimmerman.

Tires Scarce in Norway

CHRISTIANIA, NORWAY, July 30—Rubber has become so scarce in Norway that private and public automobile traffic is seriously hampered and a great number of cars have had to be taken off the roads until some arrangement can be made for

THE AUTOMOBILE

obtaining tires from abroad. On several routes the tourist service by motor omnibus has been stopped entirely.

The Royal Automobile Club and the Foreign Office are endeavoring to obtain permission from England to purchase limited quantities of manufactured rubber in London.

International Motors Raises Wages 20 Per Cent.

PHILADELPHIA, PA., Aug. 2—An eight-hour day and a 20 per cent. increase in wages to the 1200 employees of the International Motor Car Co., has been announced at the company's offices at Allentown, Pa. This big concession has come in the form of a "war bonus" because of the large orders, said to aggregate \$5,000,000, the company has for motor trucks for use in the war. Approximately 600 men are employed at the Allentown plant, and about the same number at the works in Plainfield, N. J.

Locomobile Will Share Profits

BRIDGEPORT, CONN., July 31—Notice was given to its workmen by the Locomobile Co. of America, to-day, that a plan has been adopted to share the profits of the company with its workmen by means of wage increases in proportion to the increase of product.

The plan of the Locomobile company embraces all the workmen, from the sweepers to the departmental foremen and is said to be arranged on a bonus system of \$60 per car. The scale is a sliding arrangement which allows each of the workmen a pro rata percentage. Thus for fifty cars there would be \$3,000 distributed among the men. In case of turning out more than sixty cars per week the bonus changes. For sixty-one cars it would be \$61 per car and for seventy cars it would be \$70 per car and so on.

Ten Per Cent Wage Increase for 500 Men in Autocar Plant

PHILADELPHIA, PA., July 31—According to a notice posted about the factory buildings of the Autocar Company of Ardmore, Pa., to-day, and signed by Walter Norton, vice-president and production manager of the company, employees of the concern are to receive a voluntary increase of average 10 per cent in wages accompanied by a reduction in working time of forty-five minutes daily. All overtime work will be recompensed on the basis of time and half time. About 500 men are affected.

Monahan Leaves Gibson Co.

INDIANAPOLIS, IND., Aug. 2—J. R. Monahan who has been closely affiliated with the Gibson Co. here, in an official capacity has resigned to become a commission broker.

Canadian Ford Cars \$60 Lower

Runabout \$480, Touring \$530, and Town \$780—No Rebate Up to Aug. 1

DETROIT, MICH., Aug. 3—For 1916 the new Canadian Ford prices are reduced \$60, the prices now being \$480, \$530 and \$780, respectively, for the runabout, touring car and town car. No speedometer is included at these prices. During the three next months no rebates are given but if conditions change and warrant it a rebate may be announced later.

Because the Ford Motor Co. of Canada, Ltd., sold only 18,774 cars during the fiscal year ending Aug. 1, the buyers of these cars will not receive a rebate which had been made conditional upon the sale of 30,000 cars during the fiscal year. While the Canadian business was practically uniformly good during the year, the foreign business which has always been a very important part of the Canadian plant, has dropped considerably, owing to the European war.

Knox Resigns from Lyons Atlas

INDIANAPOLIS, IND., July 31—H. A. Knox has severed his connection as general manager of the automobile department of the Lyons Atlas Co., and temporarily will return to Springfield, Mass.

Wheeler Paige Production Manager

DETROIT, MICH., July 30—W. A. Wheeler has been appointed production manager of the Paige-Detroit Motor Car Co., succeeding James F. Bourquin, who resigned last week, as reported in THE AUTOMOBILE for July 29. The Paige company has a production schedule of 20,000 cars for this year.

Scheu with Star Refining Co.

NEW YORK CITY, Aug. 3—E. A. Scheu, recently connected with the sales departments of Charles F. Kellom, Philadelphia, and the Invader Oil Co. of New York, has joined the sales department of the White Star Refining Co., Detroit. Mr. Scheu will make his headquarters at the Detroit office.

Hawkins Goes West for Midgley

LANCASTER, OHIO, July 31—The Midgley Tire & Rubber Co. this city has made arrangements with C. A. Hawkins of San Francisco to make an extensive tour throughout Western Coast States in its interests. Mr. Hawkins was for several years western representative of the White Co.

It is expected that agencies will be established in all of the principal cities on the Western Coast.

A. A. A. Gasoline Price Inquiry

Nation-Wide Investigation Planned—Report in October—Oppose Intercity Speed Tests

ERIE, PA., Aug. 2—At the conference of the executive committee of the American Automobile Association held here a nation-wide investigation of the price of gasoline was determined upon and Louis R. Spear, of Boston, was appointed to conduct the inquiry with instructions to report in October.

Gasoline made its first jump in several months on the New York market this week, going up 1 cent. This rise the Standard Oil officials ascribe to increased summer demand and market conditions.

The committee also recommended that the by-laws of the organization be revised to conform with State regulations and declared itself opposed to speed tests between cities, principally Philadelphia to New York and Boston and from Chicago to San Francisco. The committee also approved reciprocity with Canada on the question of allowing American registered cars to be operated in Canada without taking out a Canadian license. Representatives from Massachusetts, New York, New Jersey, Pennsylvania, Ohio, Indiana and Illinois attended.

Uniform Gasoline Prices in Oklahoma

OKLAHOMA CITY, OKLA., July 30—Gasoline retailers must establish uniform prices throughout the state, according to an order issued by the corporation commission in which citizens of Poteau charged the Pierce Oil Corp., the Gay Oil Co., The Texas Co. and the Magnolia Petroleum Co. with discriminating between cities in the eastern part of the state. When gasoline was selling for 16 cents a gallon in Poteau in May it was alleged by the complainants the same companies were marketing it at McAlester for 12 cents, at Muskogee for 12 cents, at Hugo for 12½ cents, at Bartlesville for 11 cents, and Fort Smith and Greenwood, Ark., for 12 and 11 cents respectively.

Hartford Electric Brake \$90

JERSEY CITY, N. J., July 29—The Hartford Suspension Co. has materially reduced the price of its Hartford electric brake. The complete apparatus heretofore was sold for \$150, but hereafter the price will be \$90.

Hoosier State Association Formed

INDIANAPOLIS, IND., Prominent citizens of Indianapolis, most of them members of the Hoosier Motor Club, Friday

filled papers of incorporation for a new organization to be known as the Hoosier State Automobile Assn. The new body plans to organize the motorists and good roads enthusiasts in all of the principal cities and towns throughout the State into local clubs. It will be affiliated with the American Automobile Assn. H. W. Patton, recently elected to the position of secretary of the Hoosier Motor Club, is the prime mover in the new organization.

Motion Pictures Show Bearing Manufacture at SKF Plant

NEW YORK CITY, July 29—P. G. Prytz, a representative of the board of directors of the Swedish factory of the SKF Ball Bearing Co. has brought over to this country a reel of motion pictures showing the buildings and work at the Aktiebolaget Svenska Kullagerfabriken, which is the Swedish name of the factory known in this country as the SKF Ball Bearing Co.

The pictures were shown to-day to a number of the American officials of the company and a group of representatives of THE AUTOMOBILE, and are remarkable in that they show that rapidity of development and system in plant layout are not peculiar to America. Since the route of travel between Sweden and this country lies outside the war zone none of the difficulties that have beset many of the importers of ball bearings have troubled the SKF company. Not indirectly due to this the plant is at present working at its full capacity and is constantly adding new buildings. The present force of men numbers 3000, and the small building which in 1907 represented the SKF factory is now almost lost to sight among the rows of huge buildings which are devoted entirely to the manufacture of ball bearings. The bearings are made for practically every use to which ball bearings can be put.

Invents Four-Wheel-Drive Truck Using Chains

GOSPORT, IND., July 31—Claude Hoadley, of this place, has built a four-wheel-drive gasoline truck on which he holds U. S. Patent No. 1,027,730. The four-wheel-drive feature as incorporated in this truck employs chain-drive to each of the four wheels, all of which are used for steering. Each axle and jackshaft group is mounted on a fifth wheel device, the same as the front axle of a horse-drawn vehicle, the conventional motor truck steering knuckle not being used. When either axle is turned the complete jackshaft and transmission system turns with it. The motor is carried in front and there is an ingenious system of power transmission from it to the front and rear jackshafts employing four universal joints and bevel and spur gearing. The steering of the front fifth wheel is through a rack and pinion.

Registrations Reflect Sales Boom

Ohio Has 161,700 Cars and California 144,500—Other States Show Gains

COLUMBUS, OHIO, Aug. 2—W. H. Walker, Ohio registrar of automobiles, has made a report covering the present year up to July 30, showing a total of 161,700 motor cars registered since the first of the year. The total registration for the whole of 1914 was approximately 122,500 which shows quite an increase for the present year. It is estimated that 175,000 cars will be registered in the Buckeye State this year.

Chauffeurs to the number of 13,643 have been registered by the department.

144,500 Cars in California

LOS ANGELES, CAL., July 27—California's motor car registrations for 1915 have reached a total of 144,500 according to the latest figures announced by the State motor vehicle department. It is claimed that this number will be greatly increased next month when the license fees are reduced 50 per cent. W. S. Goble, superintendent of the Southern California branch of the State motor division with offices in Los Angeles, predicts 150,000 registrations for the State before fall.

21,305 Is Washington's Total

OLYMPIA, WASH., July 30—The 21,305 licenses thus far issued by I. M. Howell, Secretary of State of Washington, are classified as follows: 15,842 privately owned automobiles; taxicabs, jitneys, etc., 1690; privately owned trucks and delivery cars, 1071; trucks and delivery cars for hire, 153; automobile stages, 183; dealers' demonstration machines, 183; exempt cars owned by State or cities, 49.

15,925 Cars in Kentucky

FRANKFORT, KY., July 29—Since the first of the year 15,925 automobile licenses have been issued in Kentucky, 4168 more than during the entire year 1914. Applications for licenses continue in large numbers. Motorcycle licenses to date number 1185.

208 Postal Automobiles Start

WASHINGTON, D. C., Aug. 2—Two hundred and eight automobile rural postal delivery routes distributed among eight States will start operation to-day. This means that approximately 11,440 miles of rural roads will be traveled six days a week during August by postal automobiles. In all orders have been issued authorizing 298 motor routes, varying from 50 to 64 miles.

Plants Rushed—Sales Boom Continues

Car and Accessory Factories in Detroit Report Orders Pouring In—Retail Sales Gain in Nearly All Quarters in Spite of Rainy Weather Though Chicago and Kansas City Markets Are Slowed Up

DETROIT, MICH., Aug. 2—Last week, not only was there no falling off in the demand for automobiles and parts in the Detroit district, but the pressure seems actually to be increasing. Many of the parts plants are running almost continuously, as instance the Detroit Steel Products Co., which is working three shifts with a total loss of time of only 33 min. in twice around the clock.

Automobile makers continue to be far behind on shipments and orders are still pouring in by every mail. The conditions in New England seem to be restored to normal, by proportion with the rest of the country, and it is to be noted that the South is noticeably waking up and demands are coming in from the cotton districts in a most encouraging way.

Continental Motor is commencing to occupy the new building at Muskegon, but despite this, and the second building to be ready next month, the company has orders on hand to keep the plants at full capacity till well into the winter. Bower roller bearings are being called for at double the rate for the corresponding period last year and the Gemmer Mfg. Co. considers trade to be 80 per cent better, the factory running night and day to meet the demand.

The King Motor Car Co. reports a particularly strong demand for eights from England and is shipping cars abroad every day. This experience tallies with that of the Cadillac company which has found the eight much appreciated in England and is doing an extremely satisfactory business through its London representative.

Metropolitan Territory Wants More Cars

NEW YORK CITY, Aug. 3—If it were possible to get all the cars that could have been sold in the metropolitan district during the month of July, that month would have broken all previous records for motor car sales, according to the sales managers of the representative local branches and agencies. All the well-known concerns in all price classes are selling all the cars they can ship and while deliveries are not in such bad condition that the purchaser has to wait more than three or four weeks, still the lack of facilities for deliveries on the

spot has prevented a number of sales that could have been made.

Sales Ahead of 1914

With this condition of a steady rush to fill the incoming orders, it is small wonder that sales are ahead on all sides as compared to what they were a year ago. Furthermore, July, instead of being far below June as a selling month, as has been the case in previous years, is practically on a par with it.

Speaking of Overland sales, for instance, officials of the C. T. Silver company state that they can sell all the cars that can be shipped by the hard-pressed factory. July, they state, is somewhat below June in the total volume of sales, as would be expected, but the percentage of business as compared to a year ago shows a strong advance. Ford is 135 per cent ahead of a year ago in volume of sales, Buick is 300 per cent of a year ago, according to sales manager Newton, and the cars coming through this month will probably number 400. The largest demand is of course for the smaller of the two sixes, the proportion of sales being about the same as the factory manufacturing schedule, i.e., five small to one large car. Hupmobile estimates that the metropolitan sales are just double what they were a year ago, with July as the best month ever had by the local distributor, Chas. E. Riess. At the present schedule of orders 100 cars a month are being shipped. Chalmers is doing at least one-fourth more business now than a year ago.

Delivery the Big Problem

It is not only in the lower and medium-priced cars that the sales are booming. The Pierce-Arrow states that the business of July compares favorably with that done a year ago, the question of delivery being the only one which concerns the company at the present time. The cars ordered now are delivered in September and if they could be delivered more quickly sales would be correspondingly higher. The same story is told by the dealers in higher-priced cars as in the lower: The buyer of to-day is demanding quicker delivery and the reason for this is given by many as directly traceable to the time of the 1916 announcements. However that may be, the fact remains that everyone in the metropolitan district who has cars to sell and

can deliver the goods is getting the business and getting all that he can handle. No one is complaining of having been assigned too heavy selling schedule by the home plant.

Rains Slow Up Chicago—Damage Crops

CHICAGO, ILL., Aug. 3—*Special Telegram*—Automobile trade conditions in Chicago territory have slowed up perceptibly during the past week due to heavy rains throughout the territory. For three months unusual rains have fallen, but it is becoming quite serious, as should these continue much longer, the corn crop will be injured. Hot dry weather is needed. Numerous sales in the territory are being held up and several of the Chicago distributors are getting more stocked up with cars than they have been for many months. July was a remarkable month for business with many distributors. Tire business is slower, as touring has been very much slowed up by rain, and the general accessory trade is also beginning to feel the effects of the continual rains. A still more serious aspect of the rains is that in some sections of Illinois the oat crop is being injured, much farm land being under water. In some sections where the crops are harvested, but are still in the field, it is impossible to thresh the grain. Many local dealers with 1916 lines are losing sales every day by not being able to make local deliveries, and this is giving weaker lines a favorable selling season.

Kansas and Missouri Buy Cars in Rain

KANSAS CITY, Mo., July 31—What the automobile trade would have been this summer had the weather been normal, is beyond imagination. With rain practically every day, a large portion of the territory overflowed by rivers, thousands of acres of crops ruined by floods or rains, roads impassable, and conditions such that cars could not be demonstrated—nearly every line of automobiles reports gains over last year.

Where the cars went to, how they did it, the agents and dealers are unable to say. But the records show for them-

selves—the cars are sold; and the factories know of the insistent demands that could not be met for automobiles, for Kansas and Missouri farmers evidently bought automobiles in the rain, to be prepared to use them when the skies cleared. City people bought machines in the rain and used them on the boulevards.

Largest Sales to Country

Many other lines of business send gloomy reports from the small towns and agricultural districts because of the water damage and consequent general depression. Yet, strangely enough, the largest gains in automobile sales seem to have been in sales to the country. It probably would be a fair statement, based on many inquiries, that the lighter and less expensive cars have been the more popular for the farmers. The Maxwell agency at Kansas City, for instance, seems to have fairly definite data that those light and inexpensive cars have gone with a rush into the country, for the gain in sales is over the whole southwest territory, being a gain of at least 50 per cent over the last two weeks of July in 1914. The Ford gain, too, has been very general over the territory. The Bond Motor Company had a hard record to beat in its tremendous sales of July, 1914—but it has exceeded them. It rather seems that the largest advances over 1914 have been made in the medium-priced cars, however; and this extends to both country and city. The Overland has been selling double the number of cars sent out last year, with a slight advantage for the rural trade. The reduction of price is considered one factor. The Studebaker agency was in its usual fix—sold far ahead, and held back for delivery. The Studebaker office has a close line on territory conditions; one phase of the report is enlightening—that in the spots actually flooded there has been a decrease in sales, but those spots constitute a small section of the territory. One might judge by newspaper reports that both the States were entirely overflowed; but there were many districts practically unaffected by floods. The continued rainfall damaged crops and set back business, but did not cause serious discouragement. The increases were less pronounced in the higher priced cars; but the Oldsmobile showed a steady advance; the Hudson agency is now enlarging its accommodations because of growing business.

Many Substantial Gains

As the prices rise the percentage of increase decreases. Most of the agencies of more expensive cars have held their own, many showing substantial gains. The Buick agency had a 50 per cent increase over last year's business and reports that it might have been 100 per cent had the cars been available. The

Chalmers people also report a 50 per cent increase. The Cadillac sold in excess of 25 per cent over last year's deliveries. The Hupmobile agency does not give out definite information, but declares that the sales increase is equal to if not above that of any previous year for five years past.

Of the more expensive cars the Packard people report a 25 per cent increase of sales over the 1914 season, with a tendency to greater demand at this time, during the last days of July, than has been realized earlier in the present season. The Locomobile reports a 35 per cent increase and the Marmon about the same. The Pierce-Arrow has a little better than held its own with last year's record, which those concerned seem to think was very satisfactory considering the financial situation.

The feeling all around is that the past thirty days have shown a marked improvement over sales earlier in the present year.

\$600,000,000 Crops in the Minnesota Section

MINNEAPOLIS, MINN., July 31—Figures almost unbelievable in the crop estimates for Minnesota, for the four Northwestern States, and for the ninth federal bank district, will sound as sweet music in the ears of the automobile manufacturer and distributor and the accessory dealers. They give chance for an estimate of what the automobile trade for 1916 will be, considering that the Northwestern farmer is the heavy purchaser of motor cars in this trade section.

Listen to this: The government estimate July 1 of the total of all crops in the ninth district is \$600,000,000, or 800,000,000 bushels. This district centers at Minneapolis, where the bank is situated, and extends from the middle line of Wisconsin and Upper Michigan west to Washington State.

\$300,000,000 for Wheat

Fully \$300,000,000 will be paid to the farmers of Minnesota, the Dakotas and Montana this year for wheat alone. It is expected to be the greatest small grain crop in the district's history, passing even the bumper yield of 1912. With better weather later in the season it is a question whether the corn crop will not be enormous. Rains in even the near-arid districts of the States mentioned have rushed the wheat crop along fast, have prevented rust, and in every way lent aid toward an enormous yield of grains.

The government crop statement for 1912 placed the four-State wheat yield at 282,389,000 bushels and the estimate for July 1, 1915, was 257,402,000 bushels, but experts find there has been a great improvement since the first day of the

new fiscal year. The wheat acreage sowed in the four States is 17,330,000 bushels, and would require only a small improvement per acre to make an enormous gain over the federal estimate.

The oats estimate is 266,747,000 bushels, under the 1912 figures, but an improvement has been marked in this grain also since July 1, 1915. The total barley yield is estimated at 87,668,000 bushels, and the flaxseed yield at 15,799,000.

\$410,624,000 from Farming

In this connection it must be remembered that the prices for grains are higher than last year, so that the farmer is to receive a sum total in cash greater than last year, both because the prices and the crop are much greater. Wheat, instead of being 70 to 75 cents per bushel, as last year, ranges just now well above the \$1 mark. Bumper crops and war time prices furnish the glowing outlook in which the automobile dealer is to participate.

As for Minnesota, farm experts figure that the agricultural returns in new wealth this year will be \$410,624,000. This should mean financial and industrial peace and purchasing power. Farming is well diversified in this North Star State. William Magivny, president of the Union Stockyards, South St. Paul, puts an estimated value on hogs to come in in 1915 at \$33,000,000. Most of them will come from Minnesota. The estimate is 2,250,000 hogs. Last year the record was only 1,500,000. The cash estimate last year was \$19,000,000 at this time, so the present outlook is for nearly double the valuation of a year ago in live pork. In cattle and calves the expected gain is \$11,000,000 for 1915.

In the State the corn valuation loss will be \$5,000,000, or 15 per cent, as compared with last year. Increased acreage of wheat reduces barley, rye and hay, and leaves oats at the same as last year. The wheat crop will be \$63,000,000. In Minnesota there are 1,186,000 milch cows. It is the bread and butter state of the Union, and to an even greater extent in 1915, because there are 26,000 more milch cows than last year. Low prices will permit an advance of only \$1,000,000 in dairy products for this year for the State, but the production is to be \$70,000,000.

In potatoes alone the yield is expected to be \$10,000,000. The crop has just begun to move. The crop is being financed just now on the basis of 35 cents per bushel to the farmer. Quality and quantity are good. The government estimate July 1 was 275,000 acres planted, which gives a total of 28,303,000 bushels.

Bank Deposits Increase

On top of this the net increase in deposits in State banks for the year ending July 1, 1915, was \$10,291,510, to a

total of \$49,822,205, to which may be added \$12,815,376 savings deposits, \$101,195,450 time certificates and \$468,599 in demand certificates.

Population Gains

The directory estimates of the population of Minneapolis and St. Paul show an increase in one year of 15,319, making Minneapolis a city of 360,357 and St. Paul 276,140. The government census in 1910 placed the population of Minneapolis at 301,408 and St. Paul at 214,744. To give another angle, the government estimate of population for July 1, 1915, is as follows: Minneapolis, 353,460; St. Paul, 241,999; Duluth, 91,913. These are gains respectively of 17.2 per cent, 12.8 per cent and 17.04 per cent. These are the largest of the cities of the State and reflect the gain average prevailing throughout the Northwest. The State's gain in five years is 171,053, or a total of 2,246,761.

Another form of prosperity is to be felt in the State when the Minnesota Steel Co. opens its new plant near Duluth, Nov. 1. It is an enormous institution which is to manufacture Minnesota's ore into pig and other products right on the ground. The coke ovens will be in operation Sept. 1.

82,000 Cars in Minnesota

In Minnesota, by July 31, a total of 82,000 motor cars were registered with the Secretary of State at St. Paul, and many more are in sight as the 1916 models are distributed to owners. South Dakota will license between 20,000 and 30,000 in 1916, and other Northwestern States accordingly. In Minnesota this year the Secretary estimates 100,000 cars will be licensed. The licenses are for three years.

These figures of new wealth coming are impressive, because the Northwestern farmer finances his own crops now, in effect, and having about paid up his indebtedness for land and machinery and cattle, will be ready to buy automobiles again in September, after a rest through July and August while he harvests his crops.

Republic Truck Business Grows

ALMA, MICH., July 30—General Manager F. W. Ruggles of the Republic Motor Truck Co. of this city reports that during the fiscal year the company's truck sales increased over 800 per cent, 95 per cent of the total output of the factory being consumed in the United States.

August 7 Ford Day in Venice

VENICE, CAL., July 21—The 72 Ford dealers of southern California are to join with the city officials of Venice in making the first annual Ford Day at Venice, Aug. 7, the greatest automobile celebration ever held in this end of the State.

THE AUTOMOBILE

Washington and Oregon Market Good

TACOMA, WASH., July 30—Automobile business throughout the Pacific Northwest, which includes the large centers Seattle, Portland, Spokane and Tacoma, for the week ending July 31, showed a substantial gain over the same period during 1914. The dealers in these centers have looked to the surrounding country for the bulk of their business and have not been disappointed.

In the low-priced field dealers report an increase of 50 per cent over the previous year's business with the Ford car leading, the increase being between 75 and 100 per cent. These dealers are most optimistic, and being able to make prompt delivery, many actual sales result.

Medium-priced cars are finding a ready market, the increase being in excess of 50 per cent over last year's business. The Overland and Dodge are tied for first place in the amount of sales. Although a number of dealers in this class have been forced out on account of conditions, those remaining are staple and their only handicap is slow deliveries. In many cases deposits have been made on Dodge cars ninety days in advance of deliveries.

In the higher-priced field the demand has been limited. The increase, if any, is small. However, buyers with means are investing in cars instead of loaning their surplus money as heretofore. The Cadillac eight has proved most popular in this section.

Improved road conditions in both Washington and Oregon, good prices obtained for berries and wheat, and a slightly better lumber market, have been the chief causes for increased automobile sales in this section. The optimistic reports of dealers have been checked by the increased number of licenses issued to date. Used car dealers report that the demand exceeds the supply. Banks in all large centers have placed their endorsement on automobile paper.

Rocky Mountain Dealers Want Cars

DENVER, COL., July 31—Sales increases ranging from 40 to 300 per cent over the second half of July, 1914, and a common cry on part of dealers that they can't get enough cars to fill their orders, are the leading features of the automobile trade situation in Colorado and adjacent territory in the Rocky Mountain region. And prospects are considered as being highly encouraging for the 1916 season, with a favorable crop outlook in general and a gradual revival of the mining industry in progress. The 1915 season in general shows a business running as high as four times that of the 1914 sea-

son for some makes, and several dealers predict another doubling of their sales during the 1916 season. This condition holds true throughout the Rocky Mountain territory covered by Denver distributors generally, which includes Colorado, Wyoming, New Mexico and parts of Utah, Arizona, Kansas and Nebraska.

Gains 25 to 300 Per Cent

In the low-priced field, the last half of July this year shows a sales increase of 25 per cent for the Studebaker and Reo, 50 per cent for Overland, 60 per cent for Ford, 100 per cent for Maxwell, 150 per cent for Metz, 200 per cent for Buick and 300 per cent for Chevrolet. All these lines also show a substantial increase in the total 1915 business over 1914, ranging from 50 per cent for the Studebaker up to 300 per cent for the Metz.

In the medium field, the July comparison shows a gain of 25 per cent for the Franklin, 40 per cent for the Hudson and 80 per cent for the Cadillac. On the entire season basis, the gain has been about 40 per cent for the Hudson, 43 per cent for the Cadillac and 50 per cent for the Franklin.

In the high-priced field, the Pierce business is practically the same as last year and the Packard sales have doubled during the last half of July. Sales in both these lines have been held down seriously by a shortage of cars, the Pierce people getting this week the first car they had been able to place on their floor since April. On the yearly basis, the Pierce has made a gain of 40 per cent and the Packard business has doubled.

Cars Scarce—Orders Many

The Ford assembling plant in Denver has been unable to get enough parts to keep running, and the reduced price announcement is counted upon to give August a heavy gain over the July orders. Prospective buyers have been holding off for this new price. The Buick, Maxwell, Chevrolet, Overland, Studebaker, Reo, Franklin and Hudson are also handicapped by inability to get cars fast enough, and all figure on a heavy business on the 1916 models. There were 652 Buicks sold in Colorado for 1915, as against 370 for 1914, and the 1916 forecast sets the mark at 1000. Similar illustrations of gains and prospective gains could be furnished by several other makes.

Disco to Increase Output

DETROIT, MICH., Aug. 2—The Disco Electric Starter Co. has taken necessary steps for increasing its output. Additional machinery is to be installed and the working force increased. Recently the company received a contract for its starters from the Lycoming Foundry & Machine Co., Williamsport, Pa., which makes automobile motors.

Denby Buys Briggs Factory

Truck Maker Secures Buildings and 6 Acres for \$63,500—To Move in Soon

DETROIT, MICH., Aug. 2—The Denby Motor Truck Co. has purchased from the Detroit Trust Co., trustee, the property of the bankrupt Briggs-Detroiter Co. for \$63,500. This property consists of the factory buildings and about 6 acres of land. The Denby company will move into this plant within the next few weeks.

Detroit Co. Personnel Complete

DETROIT, MICH., Aug. 2—The personnel of the newly organized Detroit Motor Car Co. is now completed, and consists of Alfred O. Dunk, president and general manager; Wallace C. Hood, general sales manager; H. B. Merrill, assistant general manager and factory superintendent; Robert T. Yeats, director of exports; Frank M. Eldredge, advertising manager; T. J. Holihan and W. S. Yale, purchasing agents.

Can't Use Akron Tire Co. Name in Pennsylvania

PHILADELPHIA, PA., Aug. 2—Judge Sulzberger in Common Pleas Court No. 1 issued a preliminary injunction restraining the Akron Tire Co., of New York, from using that name within the State of Pennsylvania. The suit was brought by the Akron Tire Co., Philadelphia, dealer in tires made at the factory at Akron, Ohio.

Pennsylvania Wins Vacuum Tread Suit

WILMINGTON, DEL., July 31—The Pennsylvania Rubber Co., Jeannette, Pa., won its suit here this week in regard to the sale of Dreadnaught Vacuum Tread seconds. Judge Bradford held that the Pennsylvania concern was entitled to an injunction prohibiting the

sale of Dreadnaught Vacuum Tread seconds without the words "Made by the Dreadnaught Tire & Rubber Co." in raised letters on the side of each tire unless the words "Vacuum Tread" be obliterated. The Dreadnaught interests are also enjoined from directly or indirectly stating that their seconds are those of the Pennsylvania company.

The vacuum tread of the Dreadnaught tires differs from that of the Pennsylvania in the design of the cup, the latter being shallower than the Pennsylvania cup and having a bar across the depression. The suit was in the U. S. district court for the district of Delaware.

Steel Market Strong

NEW YORK CITY, Aug. 3—The steel market for last week continued strong, with a large demand for high-grade steel for war munitions more pronounced. There was heavy trading and on Thursday the prices on steel made an upward trend. Bessemer steel made a small gain of 50 cents while that of open-hearth steel rose from \$22.50 to \$25, a total rise of \$2.50. The operations of the steel mills are above 90 per cent capacity. The copper markets still remain dormant with very little trading going on. There are no inquiries from either domestic or foreign sources. The production is expected to be maintained over the month of August. In some quarters it is expected that the record-breaking figures of July will be excelled by the August output. Gasoline market prices took a jump of 1 cent a gallon, making local deliveries 13 cents. This is the first jump gasoline has taken in several months. The tin market advanced a quarter of a cent yesterday on heavier deliveries on consumption. The upward tendency noted yesterday caused some consumers to cover, but buying did not reach large proportions, most of the consumers being fairly well supplied. The rest of the metal markets remained dull with very little trading. The market for crude rubber lacked new features yesterday. Trading continued quiet.

Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum . . . . .	.31	.31	.31	.31	.31	.31	.....
Antimony . . . . .	.35 1/2	.35 1/2	.35 1/2	.35 1/2	.35	.35	—.00 1/2
Beams & Channels, 100 lb.	1.36	1.36	1.25	1.25	1.25	1.25	—.11
Bessemer Steel, ton.	21.50	21.50	21.50	22.00	22.00	22.00	+.50
Copper, Elec., lb. . . . .	.18 1/2	.18 1/2	.18 1/2	.18 1/2	.18 1/2	.18 1/2	—.00 1/2
Copper, Lake, lb. . . . .	.19 1/4	.19	.19	.19 1/4	.19	.19	—.00 1/4
Cottonseed Oil, bbl.	6.00	5.96	5.96	5.92	5.85	5.94	—.06
Cyanide Potash, lb. . . . .	.23	.23	.23	.23	.23	.23	.....
Fish Oil, Menhaden, Brown . . . . .	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl. . . . .	.12	.12	.12	.13	.13	.13	+.01
Lard Oil, prime. . . . .	.87	.87	.87	.87	.87	.87	.....
Lead, 100 lb.	5.50	5.47 1/2	5.45	5.37 1/2	5.37 1/2	5.25	—.25
Linseed Oil . . . . .	.54	.54	.54	.54	.54	.54	.....
Open-Hearth Steel, ton.	22.50	22.50	22.50	25.00	25.00	25.00	+.25 00
Petroleum, bbl., Kan., crude . . . . .	.40	.40	.40	.40	.40	.50	+.10
Petroleum, bbl., Pa., crude	1.35	1.35	1.35	1.35	1.35	1.35	.....
Rapeseed Oil, refined. . . . .	.77	.77	.77	.77	.77	.77	.....
Rubber, Fine Up-River, Para . . . . .	.60	.59	.59	.58	.58	.58	—.02
Silk, raw, Ital. . . . .	..	..	3.75	..	..	3.80	+.05
Silk, raw, Japan. . . . .	..	..	3.40	..	..	3.40	.....
Sulphuric Acid, 60 Baume. . . . .	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	36.00	35.75	35.75	35.00	35.00	35.25	—.75
Tire Scrap . . . . .	.04 1/4	.04 1/4	.04 1/4	.04 1/4	.04 1/4	.04 1/4	.....

\$4,467,453 for Paris Bus Co.

French War Dept. Compensates for Vehicles Requisitioned—No Buses in Paris

PARIS, July 18—The sum of \$4,467,453 is the global indemnity paid by the French War Department to the Paris General Omnibus Co. for vehicles requisitioned since the outbreak of war. As the omnibus company had 1120 motor omnibuses in its eleven garages at the outbreak of war, and as all of these were seized immediately, the average price per motorbus works out at \$3,988.80. In reality, however, the price per bus is lower than this, for the army seized the bus company's big stock of benzol, spare parts and spare tires.

The arrangement between the French government and the Paris General Omnibus Co. was that as soon as mobilization was declared the entire fleet should pass into the hands of the military authorities. Thus, when the army order was posted on the afternoon of Aug. 1, 1914, the whole of the buses on the streets returned to their depots and were converted into meat wagons. This work was done in the omnibus company's own body shops and was carried out with such rapidity that within 48 hr. not a motor bus remained in the city of Paris. After a year's active service the army authorities declare themselves thoroughly satisfied with the results obtained from the Paris bus.

Holds Exclusive License

As the Paris General Omnibus Co. holds an exclusive concession for motor bus and trolley car service in Paris, it has been impossible to run any motor bus service within the city since the outbreak of war. A new type of bus has been designed and 100 have been built, but they were immediately requisitioned by the army authorities. There is no hope of the bus service being re-established before the beginning of next year.

Up to the year ending Aug. 1, 1914, the Paris motor buses carried 151,919,920 passengers, being an increase of more than 5,250,000 over the previous year. The bus mileage was 14,513,029, an increase of 382,372 miles, and receipts were \$4,268,912, the receipts per mile being 29.414 cents.

Kalb a Kelly-Springfield Engineer—Guilder Factory Manager

SPRINGFIELD, OHIO, July 31—Louis P. Kalb has joined the engineering department of the Kelly-Springfield Motor Truck Co., this city and Walter C. Guilder has been appointed factory manager.

THE AUTOMOBILE

Securities Markets Are Dull

Tire Issues Are Lower—Changes Range from Quarter to Eleven Points

Mr. Kalb was in the designing and experimental department of the Pierce-Arrow Motor Car Co. for the past three and a half years and before that with the Garford Co.

Mr. Guilder was with the Mack Motor Car Co., now the International Motor Co., for several years and more recently with the production department of the Timken-Detroit Axle Co.

Paige 5 per Cent Dividend—Capital Increased to \$1,000,000

DETROIT, MICH., Aug. 3—The Paige-Detroit Motor Car Co. has declared a cash dividend of 5 per cent for August, to be paid on the total new capital of the concern, that is \$1,000,000. This dividend will be paid Sept. 10 to stockholders of record Aug. 31. Officials of the company hope that the company will be able to pay a similar monthly dividend, or higher, hereafter. Thus far this year the Paige company has paid 44 per cent on its original capital stock of \$250,000.

Dividends Declared

AKRON, OHIO, July 31—The B. F. Goodrich Co., has declared the regular quarterly dividend on the preferred stock which amounts to 1½ per cent, payable Oct. 1 to stockholders of record Sept. 20.

Grossman Business Gains 55 per Cent

NEW YORK CITY, July 30—The Emil Grossman Mfg. Co.'s business this year is running ahead 55 per cent more than in any previous year. Plans are being laid for increasing its output.

Securities Markets Are Dull

Tire Issues Are Lower—Changes Range from Quarter to Eleven Points

NEW YORK CITY, Aug. 3—The securities markets were in a sensitive condition throughout last week as a result of the passing of the U. S. Rubber dividend on Friday. The markets were in a very weak and dull condition all of last week. The gains were few and small, ranging up to 11 points, this being Swinhart's figure. Losses were also small, ranging to 2½ points. Tire issues last week were somewhat lower, Goodrich, Miller and Swinehart being the only ones to show increases. Miller Rubber preferred rose 8 points, with no change in common. Swinehart showed the largest gain when it took a rise of 11 points above that of last week. U. S. preferred shows a gain of a quarter of a point, while Firestone common and preferred and Good-year preferred remained the same with no change.

Of the car stocks General Motors common is 2½ points lower and the preferred also 2 points lower than last week. Reo Motor Truck stock rose 1½ points, while that of the Reo car company rose 3¼. Studebaker and White made a rise of 2 points. The rest of the securities made no, or very little, change.

The Detroit issues were steady with a few gains. Continental Motors common showed a gain of 20 points in sympathy with the Wall Street prices. Its pre-

ferred remained the same as last week. The rest of the changes ranged in gains from ¼ to 2¼ points. In the inactive stocks the only change that occurred was that of W. K. Pruden company with a gain of 75 points. The rest of the stocks remained dull with very little bidding going on.

McKee with Pathfinder

INDIANAPOLIS, IND., Aug. 2—The Pathfinder Co. has retained Homer McKee as advertising counsel, the new arrangement to take effect at once. W. C. Teasdale retains the presidency of the Pathfinder Co., with W. K. Bromley as secretary and treasurer.

Dalrymple with Standard Truck

DETROIT, MICH., July 30—G. H. Dalrymple, who has been connected with the automobile industry for the past nine years, and who was formerly with the Speedwell Co. of Dayton, Ohio, has joined the sales staff of the Standard Motor Truck Co. of Detroit, Mich., and will travel in Indiana and Ohio.

Turner Leaves Lovell-McConnell

NEWARK, N. J., July 30—W. O. Turner has resigned as secretary and director of the Lovell-McConnell Mfg. Co. Mr. Turner has been in poor health for over a year and will take a rest of one or two months.

Burpee Splitdorf Branch Assistant

PHILADELPHIA, PA., Aug. 2—Thomas F. Burpee has been made assistant manager at the Philadelphia branch of the Splitdorf Electrical Co.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1914		1915		Wk's Ch'ge
	Bld	Asked	Bld	Asked	
Ajax-Grieb Rubber Co. com.....	220	..	300	110	+1
Ajax-Grieb Rubber Co. pfd.....	99	101	101	101	..
Aluminum Castings pfd.....	98	102	98	101	..
I. I. Case pfd.....	82	85	70	79	..
Chalmers Motor Co. com.....	..	102	90	92½	-1
Chalmers Motor Co. pfd.....	93	96	96	97½	-1
Electric Storage Battery Co.....	50	51	52	53	..
Firestone Tire & Rubber Co. com.....	300	325	506	512	..
Firestone Tire & Rubber Co. pfd.....	107	110	109	111	..
General Motors Co. com.....	57	60	177	179	-2½
General Motors Co. pfd.....	78	80	103	105	-2
B. F. Goodrich Co. com.....	19	21	51	53	+1
B. F. Goodrich Co. pfd.....	88	90	103½	104½	-1
Goodyear Tire & Rubber Co. com.....	170	185	268	271	-1
Goodyear Tire & Rubber Co. pfd.....	97	100	105	106½	..
Gray & Davis, Inc., pfd.....	97	102½	..	..	..
International Motor Co. com.....	..	3	15	17	-2
International Motor Co. pfd.....	3	9	38	42	-2
Kelly-Springfield Tire Co. com.....	48	52	..	..	..
Kelly-Springfield Tire Co. 1st pfd.....	70	75	84½	86	+ ½
Kelly-Springfield Tire Co. 2d pfd.....	85	92	160	170	-2
Maxwell Motor Co. com.....	9	10	33	34½	-2½
Maxwell Motor Co. 1st pfd.....	25	30	82	83	-2
Maxwell Motor Co. 2d pfd.....	12	14	29	31	-2
Miller Rubber Co. com.....	..	..	196	199	..
Miller Rubber Co. pfd.....	..	104	106	+8	..
New Departure Mfg. Co. com.....	124	127	..	..	..
New Departure Mfg. Co. pfd.....	105	108	..	..	..
Packard Motor Car Co. com.....	..	112	110	115	..
Packard Motor Car Co. pfd.....	95	..	..	100½	..
Peerless Motor Car Co. com.....	10	17	..	70	..
Peerless Motor Car Co. pfd.....	..	50	..	86½	..
Portage Rubber Co. com.....	..	30	36	38½	..
Portage Rubber Co. pfd.....	..	90	92	95	..
*Reo Motor Car Co.	19	21	30¾	32	+ ¾
*Reo Motor Truck Co.	11	13	17	18½	+ 1½
Splitdorf Electric Co. pfd.....	40	50	..	..	..
Stewart-Warner Speed. Corp. com.....	40	45	63	64½	-2½
Stewart-Warner Speed. Corp. pfd.....	97	98½	105	107	..
Studebaker Corporation com.....	27	29	84	85	+ ½
Studebaker Corporation pfd	80	84	101	102½	+2

	1914		1915		Wk's Ch'ge
	Bld	Asked	Bld	Asked	
Swinehart Tire & Rubber Co.....	.84	86	88	92	+1
Texas Company	130	131	131½	133	+1½
U. S. Rubber Co. com.....	44	46	45	46	+1½
U. S. Rubber Co. pfd.....	96	98	101½	103	- ¼
Vacuum Oil Co.....	208	212	204	210	+5
White Co. pfd.....	107	110	103	108	+1
Willys-Overland Co. com.....	80	85	134	135½	+2
Willys-Overland Co. pfd.....	..	93	103	105	+1

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

	ACTIVE STOCKS	
Chalmers Motor Co. com.....	101	90
Chalmers Motor Co. pfd.....	94	97½
Continental Motor Co. com.....	155	225
Continental Motor Co. pfd.....	75	86
General Motors Co. com.....	74	181
General Motors Co. pfd.....	86	106
Maxwell Motor Co. com.....	12	35
Maxwell Motor Co. 1st pfd.....	41	84
Maxwell Motor Co. 2d pfd.....	16½	31
Packard Motor Car Co. com.....	112	115½
Packard Motor Car Co. pfd.....	97	100½
*Reo Motor Car Co.	20¾	32½
*Reo Motor Truck Co.	12½	18
Studebaker Corp. com.....	..	83½
Studebaker Corp. pfd.....	..	100

	INACTIVE STOCKS	
*Atlas Drop Forge Co.	19	25½
Ford Motor Co. of Canada.....	..	1475
Kelsey Wheel Co.	185	205
*W. K. Pruden Co.	20½	20½
Regal Motor Car Co. pfd.....	23	21

	BONDS	
General Motors, notes, 6s, 1915.....	100	101½
Packard Motor Co., 5s, 1916.....	95	98½

*Par value, \$10; all others, \$100 par value.

France Orders Machinery Declared

Lathes, Presses, Hammers, Etc., Must Be Brought to Authorities' Attention

PARIS, July 24—A law just passed by the Chamber of Deputies declares that all metal-working lathes, hydraulic and other types of presses, and steam hammers must be declared to the military authorities. A period of ten days is allowed for making the declaration, which is binding on all owners, hirers, or in cases where the owner is absent on caretakers and landlords. The penalty for failing to declare is a fine of \$10 to \$200, and \$10 to \$400 for a false declaration.

Affects Automobile Industry

This new law particularly affects the automobile industry of Paris and surrounding district. There are around Paris hundreds of small shops doing work for the big automobile factories or building a small number of automobiles. Many of these shops are well equipped and undertake really high class work. As an instance, practically the whole of the machining of the parts for the Peugeot racing cars is done in the small outside shops and only assembled in the Peugeot racing department. The parts for Panhard motors for racing motor-boats are machined outside; much of the special and experimental work for Delaunay-Belleville and Hispano-Suiza, to mention only two high-class firms, is undertaken by the small machine shops. With the large amount of experimental work always in progress in the French automobile industry, this system has become very extensive and has been found to give good results, for it does not disturb the normal output of the factory.

As the tendency of the war department is to attach themselves to the big firms, it is felt that sufficient use is not being made of the small shops. There are also cases where owners of machine shops have been called up for military service, causing their establishments to be closed and the machines to stand idle. The object of the law is to discover exactly what number of lathes, presses and steam hammers is standing idle and to put this machinery into use as early as possible. As it is difficult for a big corporation like the war department to deal with a multitude of small shops possessing two or three lathes each, there will be formed a series of co-operative societies, each under the control of an experienced manager. Where necessary, machinery will be removed from the shops in which it is now inactive and installed in a co-operative workshop. It is considered by the ammunition section of the war de-

partment that this system of industrial organization is almost as important as the creation of new shops equipped with new machinery brought from America.

The scheme has already been tested with satisfactory results among the small metal working firms attached to the automobile body building industry. These firms, which specialized in fenders, sheet iron work for automobile bodies, forgings for carrying fenders, wind-screens, lamps and searchlights, were individually unable to do any effective work for the army, or to get material for executing private orders. In most cases, too, the owners were unacquainted with the routine necessary to get into touch with the department of the war office responsible for giving out orders. By forming them into co-operative groups, each one under the control of a competent business manager, they have been able to do very valuable work in the production of army field kitchens, mountings for anti-aircraft guns, army wagons, and different kinds of military equipment.

There is little or no change in the French automobile factories, which continue to work at high pressure on army orders: shells, guns, darts, bombs, and special types of automobiles for military purposes. Practically no cars are being produced for the French private trade.

A batch of 500 Jeffery $\frac{3}{4}$ -ton trucks has been received in the French depots. These have come in chassis form, equipped with twin pneumatic tires at the rear. Bodies are to be built and fitted in the French bodymaking shops.

\$216,027 for United States Metal Products Co. Assets in Sale

NEW YORK CITY, Aug. 2—The property and assets of the United States Metal Products Co., this city were sold at auction yesterday under the direction of John J. Townsend, referee in bankruptcy. There were forty-seven parcels in the sale and the total amount realized was \$216,027. The creditors' committee bid \$204,000 for most of the parcels and the rest went to outsiders for \$12,027.

Among the parcels sold were the right, title and interest in the real estate and buildings at College Point, \$40,000; patents, trademarks and welding contracts \$10,000; recorders and motor trucks, \$2,600; office equipment, \$2,000. A petition in bankruptcy was filed against the company Nov. 13, 1914, and liabilities were \$1,008,550.

Christensen for Navy Board?

MILWAUKEE, WIS., Aug. 2—Nels A. Christensen, president of the Christensen Engineering Co., and one of the foremost inventors of compressed air appliances in America, may be appointed a member of the new United States naval advisory board.

Pa. Horn Trap Is Hard Hit

Court Orders Verdict of Not Guilty for Harrisburg Club Secretary in Test Case

HARRISBURG, PA., Aug. 2—The horn trap in Pennsylvania was given a hard blow by a decision of Judge Johnson in the Dauphin county court at Harrisburg last week when a verdict of guilty was set aside and a verdict of not guilty ordered by the Court.

Secretary J. Clyde Myton, of the Motor Club of Harrisburg offered himself in the case against a constable and justice of the peace at Middletown, Pa. where a horn trap was maintained during the summer for several years. Each Sunday hundreds of motorists would be caught and notified to pay a fine or costs and the constables and justice made a big "killing." The case was not fought in the court, Mr. Myton pleading guilty but then the case was argued on the grounds that the constables had no jurisdiction to erect the signs and make arrests without the sanction and action of the township authorities.

The victory for the Motor Club shows that "horn traps" cannot be maintained unless signs are regularly authorized by borough or township official boards. Action will likely be taken against the constables and the justice of the peace to recover all money paid to them in the past and it is possible that other more serious charges will be preferred.

Ban Horns Near Churches

RED BANK, N. J., Aug. 3—Automobilists operating their horns within 500 ft. of any of the local churches during Sunday morning service will be arrested.

Edenburn A. A. Mich. Representative

DETROIT, MICH., Aug. 3—W. D. Edenburn has been appointed Michigan representative of the contest board of the A. A. A.

License Revoked for Intoxication

HARRISBURG, PA., July 30—State Highway Commissioner Cunningham has revoked the automobile license of Grover Zeller of Warren on information from District Attorney Frank J. Lyon that Zeller had been operating an automobile while intoxicated. Zeller was notified to appear for a hearing but failed to do so.

Wisconsin May Order Dimmers

MILWAUKEE, WIS., Aug. 2—It is likely that a law requiring every motor car to be equipped with a device for dimming the headlights will be passed by

THE AUTOMOBILE

New Georgia Law Proposed

Bill Introduced Providing for \$4 to \$10 Fees on Hp. Basis—Dealers \$30

the Wisconsin Legislature, which is still in session. A bill of this kind was killed in the State Senate, but reconsidered and is now slated for passage. The bill provides that no light shall be used which dazzles the eye, and each car must have a device whereby the light can be dimmed reasonably when within 250 feet of an approaching vehicle. The bill also has a provision that it shall be unlawful to drive a car at such speed that it cannot be stopped within the distance ahead that the driver can see an object the size of a person.

To Change Drivers' License Requirements in Massachusetts

BOSTON, MASS., Aug. 1—As a result of criticism by Judge Bryan and coupled with several serious accidents the Massachusetts Highway Commission plans to change the system of granting motor licenses to private owners in the future. Judge Bryan, in dealing with a court case before him, said that he had a license to drive any kind of a motor car when, as a matter of fact, the only one he knew anything about was an electric. He said the system was all wrong. So the commission took the matter up, and it will put into force a ruling that an owner must specify what kind of a machine he wants to drive and he will be limited solely to that type.

Jitneys Stopped in Richmond

RICHMOND, VA., July 30—The jitney ordinance requiring a bond for each car operated in Richmond has driven all the jitney buses from the streets except one, which is testing the validity of the ordinance in the courts. As a result of the suspension of jitney traffic the street cars were packed and many persons were late getting to work.

1000 Arrests in Pittsburgh

PITTSBURGH, PA., July 30—At least 1000 alleged violators of the traffic and speed laws of the city were served with summons as a result of a crusade instigated by Mayor Armstrong against speed-mad drivers.

Speed Trap in Orange County

WALDEN, N. Y., July 30—When touring through Orange County beware of the speed trap at Walden. The police are arresting on first offense, giving no warning. The speed limit is 15 m.p.h.

Disco Gets Two Contracts

DETROIT, MICH., July 29—The Disco Electric Starter Co. has recently closed contracts with the Bimel Buggy Co., Sidney, Ohio, and the Canadian Regal Motor Car Co., Berlin, Ont., whereby the cars made by these concerns will have the Disco starter equipment on their 1916 models.

concern claims assets having a total value of \$15,100, consisting principally of machinery, tools, equipment, stock and also U. S. letter patent No. 1,030,357.

The first meeting of the creditors is to be held in the bankruptcy court Aug. 12.

To Reorganize Jagers Manufacturing Co.

RACINE, WIS., July 24—The George W. Jagers Mfg. Co., Racine, Wis., gasoline engines, is about to be reorganized by a committee of creditors. The company ceased operations about three weeks ago because of lack of working capital. It holds a large contract to furnish motors for the Argo Motor Co., Jackson, Mich., and under the reorganization plan new capital will be introduced to fulfill a large number of orders now awaiting production. The creditors' committee has requested all claimants to accept a part-cash, part-note and part-stock settlement of accounts payable and it is expected that with the business in sight there will be no objection to the plan by any of them.

Hawkeye Tire Co. Formed

DES MOINES, IOWA, Aug. 3—The Hawkeye Tire Co., has been organized here and will build a factory as soon as arrangements can be completed. The company was formed by I. V. McLean who will be its first president. On the board of directors are E. Raffensperger, O. B. Hextell, T. H. Dexter and J. T. Christie. The company will place \$200,000 of preferred and \$300,000 of common stock on the market. A full line of tires will be manufactured.

Standard Tire Co. Organized

KEOKUK, IOWA, Aug. 2—The executive council has issued an order authorizing the Standard Tire Co. of Keokuk to issue its stock. This is a new corporation organized here for the manufacture of automobile tires. It expects to operate upon a fairly large scale as soon as its plant is ready.

Studebaker to Buy Elkhart Plant

SOUTH BEND, IND., July 30—The Conn Musical Instrument factory at Elkhart, Ind., is to be taken over by the Studebakers of South Bend. Colonel G. M. Studebaker and Clement Studebaker, it is stated, have arranged to purchase the property for \$800,000.

Ford Plant for Oklahoma City

OKLAHOMA CITY, OKLA., July 30—An assembling plant that will employ between 300 and 500 men is to be built in this city by the Ford Motor Co. within the next six months. The plant will be situated on the block of ground west of the court house.

Oldfield Breaks Four Records

Cuts Times for 1, 3, 4 and 5 Miles in Exhibition Trials at Cleveland

CLEVELAND, OHIO, Aug. 2—Four world's records for a dirt track are reported broken by Barney Oldfield in an exhibition trial for records held here yesterday under the sanction of the American Automobile Assn. The new times are: 1 mile 0:46 1/4; 3 miles, 2:25 2/5; 4 miles 3:13 3/5 and 5 miles 4:03 1/5. The former mile mark held by Oldfield was 0:46 2/5. Disbrow held the other records in 2:27.81; 3:17.2 and 4:06.58.

The rules of the American Automobile Assn. provide that all records established for distances under 5 miles shall be timed by an automatic timing device.

Twin City Speedway Progresses

TWIN CITY, MINN., July 31—The Twin City Motor Speedway work progresses rapidly. Nearly 1 mile of concrete is completed, which is one-half the length of the track. One grandstand is completed, there are to be six and two bleachers. The grading of the track and inclosure is completed and the subways are being built. Two more entries have been made for the 500-mile Derby on Sept. 4, those of Resta and DePalma. The street railway company will construct lines to the grounds if the association will get right-of-way across Fort Snelling reservation from the government and grade it. The speedway location adjoins Fort Snelling, which is between Minneapolis and St. Paul.

Three Peugeot cars have been entered for the World's Derby, Sept. 4, on the Twin City Motor Speedway. They will be driven by Ralph Mulford, Johnny Aitken and Howard Wilcox. The Mulford car was entered by Luther Brown of Orange, Tex., and the other two by the Speedway Association of America. Seat sales for the race are going along rapidly and work is progressing, so that it will be completed by Aug. 15 for the preliminaries.

Los Angeles Show in October

LOS ANGELES, CAL., July 25—California's greatest automobile show is to be held in Los Angeles the latter part of October. The event is to be known as the Broadway Automobile and Flower Show and is to be held under the auspices of the automobile dealers of Los Angeles.

Councilman J. S. Conwell has been named as manager of the show, and the committee appointed from the motor car dealers includes Ralph C. Hamlin, P. H. Greer and Earle C. Anthony.

In the entire building, which is located in the very center of the business district of Los Angeles, there are 60,000 ft. of floor space. A large share of this has already been sold.

Parade to Sheepshead Practice

NEW YORK CITY, Aug. 2—Practice for the forthcoming race on the Sheepshead Bay Speedway will be inaugurated by a parade Sept. 18, which will be promoted by the Motor Club of New York, and in which it is expected many New York and Brooklyn dealers will participate. One section of the parade will be for decorated cars for which prizes will be offered. There will also be a prize for the dealer having the greatest number of owners' cars in line. Participants in the parade will be permitted to view the practice free.

Kokomo Man Wins Saxon Fuel Economy Prize

DETROIT, MICH., July 29—The jury of local newspaper representatives has awarded first prize in the Saxon Motor Co. economy run to C. E. Seaward, Jr., Kokomo, Ind., who covered 327.2 miles, averaging 26.2 miles to the gallon of gasoline and consuming 1 quart of oil.

J. S. Hoffman, Sharon, Pa., averaged 26 2/3 miles to the gallon of gasoline, or better than the winner's record, but he covered a shorter course and had better roads. William P. Knipper, Rochester, N. Y., made a non-stop run of 462 miles, it is said, averaging 24 miles to the gallon of gasoline. Another long run was made by Miss Edna Riesenthal, Milwaukee, Wis., who, it is said, drove 480 miles at an average of 24 miles to the gallon.

A total distance of 26,377 miles was covered by the 105 contestants, who averaged 252 miles each. The average consumption was 1 gal. of gasoline per 21 miles and 1 quart of oil for a distance of 152 miles.

Portland Plans October Show

PORTLAND, ME., Aug. 1—Maine will probably have the honor of opening the 1916 show season in New England if plans discussed by the Portland dealers go through. They met a few days ago and began arrangements to have a motor show in the Exposition building on Park Avenue in October.

Lawrence Takes Velie in Chicago

CHICAGO, ILL., Aug. 4—The Velie agency in Chicago has been taken over by J. V. Lawrence who has opened sales-rooms at 2530 Michigan Avenue. Mr. Lawrence has for years been a partner with H. Paulman & Co., Pierce-Arrow agent, and will retain his connection with this organization, dividing his time between the two concerns.

Eight Qualify for Des Moines

DePalma Nearly Breaks Record for 5 Miles—More Elimination Trials

DES MOINES, IOWA, Aug. 2—Ralph DePalma and his "Stuttering Stutz" came within 5.6 sec. of the world's record for 5 miles and eight cars and drivers qualified for the Des Moines Speedway races on Aug. 7 at the elimination trials held Saturday. Two cars and drivers failing to qualify were Barndollar with a Clergy Special and Lombardi with an O'Connell Special. Fred J. Wagner was official starter and timer.

97 1-3 M.P.H. by DePalma

DePalma lengthened his elimination mile to a 5-mile exhibition. His first lap, the elimination mile, was in 36.98 sec. or at the rate of 97 1/3 m.p.h. and was the fastest mile of the day, in the eliminations. In the last four laps of his 5-mile exhibition he made three laps in 36.9 each and his time for the 5 miles was 3 min., 4.65 sec., or at the rate of 97.5 m.p.h. Bob Burman made an exhibition 5 miles in 3 min. 8.33 sec. or 95.4 m.p.h. Later he stretched his elimination mile, made in 37 sec., to a 5-mile exhibition which was halted when he blew his outer rear tire in the last lap. He kept the car on the track.

Eddie O'Donnell of the Duesenberg team qualified in two cars, one for himself and one for Ralph Mulford who had not arrived and who will drive one of the Duesenbergs in the big race. Elimination miles were as follows:

Driver	Car	Seconds	M.P.H.
DePalma	Stutz	36.98	97.33
Burman	Peugeot	37.00	97.00
Cooper	Sebring	38.60	94.00
Alley	Ogren	40.20	89.20
Brown	DuChesnau	50.00	77.50
Barndollar	Clergy Spl.	50.00	77.50
Strunk	White Spl.	40.40	89.00
Chandler	Duesenberg	42.33	84.25
O'Donnell	Duesenberg	42.60	84.00

O'Donnell also qualified a Duesenberg car for Mulford. Starter Wagner fixed a minimum speed of 80 m.p.h. for one lap as necessary to qualify for the race. Those which failed to qualify Saturday have two more trials to make good. A. F. Scott, pilot of an Anderson Special, deferred his tryout because of damage to his car.

The ranking of the drivers who qualified Saturday is as follows: DePalma, Burman, Mulford (by O'Donnell), Cooper, Chandler, Alley, Strunk, O'Donnell.

Additional elimination trials will be held on Tuesday and Wednesday afternoons of this week. Indications are that ten cars will qualify for the main event which will be for a distance of 300 miles and for prizes aggregating \$10,000.

Thrills at Rose City Speedway

Parsons, Elliott and Lentz Stars in 2-Day Race Meet —Small Attendance

PORLAND, ORE., July 28—In the Northwest automobile events held here July 24 and 25 the winners were James Parsons, Frank Elliott and Ray Lentz before a crowd of 1500 who gathered at the Rose City Speedway.

The fastest mile of the afternoon, 53 sec. flat was credited to Jim Parsons when each of the drivers were sent away separately with flying starts, but the best time in racing fell to the honor of Frank Elliott, in his Gordon Special, who made the twenty-first and twenty-second laps of the 25 mile event in 54 3/5 sec. each.

In the 25 mile event it was nip and tuck between Parsons and Elliott for most of the distance; Elliott leading for the first 10 miles when Parsons was a nose ahead and it looked as if he was a possible winner, but tire trouble slowed him up and the white Gordon won by inches. Harry Stratton's Mercer, which was piloted by Sig. Tafil, lagged woefully in the rear. The time for the event was 23 min. 23 1/5 sec.

The record time for Portland was established last year when Percy Barnes with the eight-cylinder Romano made the quarter century in 22 min. 7 1/2 sec.

Some of the real thrills of the day resulted when the Gordon Special, Parsons Special and Schneider and Stutz specials were turned loose on the 10-mile event. After grabbing the pole at the start and keeping it for seven laps Elliott was bettered by Parsons, who had to make four consecutive laps in less than 56 sec. to turn the trick. The total time for the event including the start was 9 min. and 25 sec., and the fastest lap was the final one done in 55 1/5 sec. Gus Duray got the upper hand with his Schneider Special, beating Oral Palmer to third place, the latter driving the Stutz piloted by Earl Cooper in 1913.

In the 15-mile event Lentz with Barsby's Velie won easily in 15 min. and 8 sec. Fred Forbes finished second in his Buick.

After winning the first two races in the first day's events in very exciting finishes, Jim Parsons was forced to withdraw from the 50-mile contest, and left Frank Elliott driving his Gordon Special complete master of the situation. Elliott ran away from the balance of the field and finished the 50 miles in 50 min. 27 4/5 sec.

This time would have been very much faster had it not been for the fact that a drove of horses were allowed by the

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groundkeeper to get out on the track. Harry D. Stratton driving a Mercer special finished second, and Gus Duray, in Schneider special, third. Fred Forbes, driving his Buick Special, was a close contender for second honors for twenty-four laps, when he was forced to the pits with valve trouble.

Parsons took the special match race of 3 miles from Ernest Schneider after being forced to drive the fastest three laps made during the meet. Parsons finished in 2 min. 51 3/5 sec.

The Velie special driven by Ray Lentz was the star performer in the second flight of cars, winning both the 5-mile and 10-mile race, but was forced out of the big race in the sixth lap on account of engine trouble.

Properly-Designed Muffler Can Increase Power Output

LONDON, ENGLAND, July 30—Increasing the horsepower of an engine by adding a properly designed muffler is proven in a recent issue of *The Autocar* in which experiments are described by one, C. J. Booth, who with a standard four-cylinder engine, 100 by 140 mm. (3.93 by 5.51 in.), was able to show an increase in horsepower by fitting satisfactory mufflers, as compared with the power generated when neither muffler nor exhaust manifold was fitted. With the engine operating at 1750 r.p.m., the horsepower obtained without a muffler or exhaust pipe was 41.75; when long straight exhaust pipes which ran with easy sweeps into one exhaust pipe were added, the power was raised to 44.5 hp.; when the standard muffler used on the car with the standard exhaust pipes was fitted the horsepower was 36.75, or less than without exhaust pipes or muffler; and finally when this standard muffler was taken and modified the horsepower output was increased to 42, which was in advance of that obtained without muffler or exhaust manifold.

At lower crankshaft speeds similar results were obtained, although not so prominent. The accompanying table shows the results at different crankshaft speeds. The tests were made with an ordinary electrical dynamometer. The type of muffler used was a simple one, having an expansion chamber divided by three baffle plates. By removing two of the baffle plates, it was possible to obtain increased power as shown in test 4 in the tabulation.

Power Tests With and Without Muffler at Different Speeds

Engine r.p.m.	Test No. 1 with Standard Silencer H.P.	Test No. 2 without Silencer or Exhaust Pipe		Test No. 3 with Exhaust Pipe Only H.P.	Test No. 4 with Standard Silencer Modified H.P.
		H.P.	H.P.		
500.....	14	14 1/4	14 1/4	14 1/4	14 1/4
750.....	22 1/2	23 1/2	23 1/2	23 1/2	23 1/2
1000.....	28 1/2	30 1/2	30 1/2	30 1/2	30 1/2
1250.....	33 1/4	36 1/2	37 1/4	36 1/4	36 1/4
1500.....	36	40 1/2	42	41	41
1750.....	36 1/2	41 1/2	44 1/2	42	42

Europe Developing 8's and 12's

To Appear on Market After the War—Aviation Practice of Value

PARIS, July 26—If the war had not intervened, it is certain that the 1915 European shows would have marked the appearance of twelve-cylinder motors. In England the Sunbeam company has produced a twelve for aviation purposes, and is already supplying this type of motor in big quantities to the British and French flying corps. It is understood that Sunbeam has made all arrangements for producing a car with a twelve-cylinder motor, but this cannot be offered to the public, for the entire output of the factory has been requisitioned for military purposes. It is declared that the car is fitted with two speeds only, the low gear being for starting away and emergency service, for the motor will be capable of doing 99 per cent of its work through direct drive.

Renault is also credited with the production of a twelve-cylinder motor which will first be used on aeroplanes. Up to the present Renault has devoted all his attention to the building of eight-cylinder V-type air-cooled aviation motors, in which field he has been very successful. The demand is for bigger and more powerfully armed aeroplanes, necessitating the use of motors from 200 to 300 hp. In very many cases these new flying machines have been fitted with two purely aeroplane type motors of 120 to 150 hp. each, the type of motor most commonly used being those with seven or nine fixed cylinders around a circular crankcase. The value of the big, heavily armored aeroplane having been proved, the call now is for very big light-weight, water-cooled twelve- and eight-cylinder motors. It is not known whether Renault has any intention applying his twelve-cylinder motor to cars, but there is no doubt that the experience gained in the air will be useful on the road.

What Makers Are Doing

Engineer Henry, who was responsible for the design of all the Peugeot sixteen-valve racing motors, has presented to the army his first series of eight-cylinder thirty-two-valve aviation motors of the

same general design as the four-cylinder motors used in European and American races the last two or three years. Henry has produced these motors in conjunction with Despujols and Barriquand, having severed his connection with the Peugeot company. Lorraine Dietrich is producing a six-cylinder aviation motor of the same general design as the Mercedes engine. Fiat has built a large number of motors of this type. Clerget, a leading French aeroplane motor specialist, has opened a big factory in Italy for supplying aeroplane motors to the Italian army. Canton-Unné, another aeroplane motor specialist, is now building in Russia, in addition to running a French factory which has been tripled since the outbreak of war.

Not on American Scale

Several French car factories have studied the eight-cylinder situation very closely and have practically decided to put an eight on the market as soon as the war is over. At the present time it is impossible to do more than the experimental work. Although the eight and the twelve are attracting interest, it is certain that they will not be built in Europe in anything like the same proportion as in America. The point is that aviation developments are tending toward the eight and twelve fixed cylinder motor, in preference to the seven and fourteen rotary, and this tendency will have its influence on the automobile situation.

Many Sales on Ohio Tour

COLUMBUS, OHIO, July 31—A booster automobile tour under the auspices of the *Ohio State Journal* was pulled off last week with excellent results by a general committee representing car agents and dealers in accessories. Stops were made at Lancaster, Circleville, Washington Court House, Chillicothe, Springfield, South Charleston, London, Plain City, Marysville, Delaware, Marion, Mount Gilead, Fredericktown, Mount Vernon, Utica and Newark.

From the business standpoint all of the agents who participated believed it was a good thing. Many prospects were secured, and it is planned to run such a tour each year. About a score of cars were represented in the tour.

Carolina's Wholesale Supply House

CHARLOTTE, N. C.—The Carolinas Automobile Supply House, Inc., has been formed to handle automobile accessories in a wholesale way throughout the two Carolinas. The company will make a specialty of parts and accessories for Ford cars. Joseph G. Fitzsimons is president and general manager, William A. Graham, vice-president, and Wade A. Montgomery, secretary and treasurer.

Dealer to Pay Car Freight

Los Angeles Distributor Will Sell for Cash Only—No Used Cars

LOS ANGELES, CAL., July 27—Lynn C. Buxton, distributor of the Moon and Lexington lines in southern California, has created a sensation throughout the automobile industry of this section by announcing that he will pay the freight on all cars sold in his territory. Buxton further announced that in the future he will sell for cash only, making no time deals and taking in no used cars on new models.

In the past the freight has always been added to the purchase price of cars sold in southern California and on the large machines this has meant a great increase in first cost. Selling for cash, the local dealer is selling all cars at the factory price, something unheard of before in southern California.

The majority of the Los Angeles dealers operate used car departments, but Buxton intends to eliminate the used car from his business through his cash sales system.

Packard Takes Over Boston Service Station and Salesrooms

BOSTON, MASS., Aug. 1—Papers were filed in the registry of deeds at Boston this morning transferring from Alvan T. Fuller to the Packard Motor Car Co. of Detroit, Mich. the big service station and salesrooms of the Boston Packard branch. The stamps on the papers indicated that the sale represented \$285,000. That is about the value of the building.

Mr. Fuller could not be seen all day, and at the office of his company when it was stated that the inference from the sale would be that the Packard Motor Car Co. of Detroit had taken the business over as a branch some of the subordinates stated that such was not the case. But they would go no further in saying anything.

In taking over the Boston business the Packard company would also have to take over the Providence and Portland business controlled by Mr. Fuller to make the matter complete. So the entire transaction would represent at least a deal involving \$1,000,000.

Capt. Ryus Heads California Oldsmobile Sales Forces

LOS ANGELES, CAL., July 26—Capt. Harmon D. Ryus, one of the oldest men in the automobile industry of California in point of service, who for the past five years has been manager of the Olds-

mobile factory branch at Los Angeles, is now president and general manager of the Oldsmobile Co. of California.

With F. G. Seager of New York and Pasadena, Cal., Captain Ryus purchased the Los Angeles and San Francisco factory branches and the Pacific Coast agency for the Oldsmobile. This agency territory includes California, Oregon, Washington, Arizona, Nevada, the Hawaiian Islands and western half of Idaho.

The San Francisco branch will be in charge of Captain Ryus, and the main offices of the Oldsmobile Co. of California will be located in San Francisco. The branch and agency connections are now being completed.

With the exception of Larson, New York distributor, the company of which Ryus is now head is the largest Oldsmobile distributing organization.

Limousine Top Co. Formed

KALAMAZOO, MICH., July 31—The Limousine Top Co. has been formed here to manufacture demountable tops in lots for manufacturers of automobiles, dealers and distributors of certain makes of cars and for individual car owners. The company is capitalized at \$30,000, and is composed of James D. Bobb, Lorenzo T. Bennett, David H. Harris, Frank H. Milham, W. D. Milham, Burton E. Barber, W. E. Kidder, Glenn S. Allen, Harry L. Vander Horst, George J. Putt, James H. Dewing, Dr. W. E. Upjohn, Frank Warner and Vernon T. Barker. The company has already secured a number of contracts and expects to increase its force of mechanics to 100 or 150 in the near future. In addition to making demountable tops the concern plans the manufacture of bodies and a line of accessories. Factory quarters are in the old Michigan Buggy Building.

Don Lee Gets Oakland

SAN FRANCISCO, CAL., July 29—Don Lee, who long has represented the Cadillac in northern California, has been made distributor for the same territory for the Oakland. The branch which the Oakland company has maintained in San Francisco will be discontinued. R. A. Roberts, Pacific Coast sales manager for the Oakland company who was in charge of the branch, will maintain an office at the Don Lee headquarters.

\$200 Fee for Filling Stations

DENVER, COL., July 29—A yearly license fee of \$200 for motor car filling stations is provided by an ordinance just passed by the city council. The new law is interpreted as applying only to the regular filling stations that deal exclusively in gasoline and oil, and not to garages. Denver now has sixteen of these filling stations, which have all

been installed during the last two years. Some of the filling station proprietors claim the law is unjust and that it involves class legislation. Little hope is expressed of getting the measure set aside, however. The new ordinance is regarded generally as likely to prove a benefit to garages.

To Distribute Dolly Madison

INDIANAPOLIS, IND., Aug. 2—The Darnelle Motor Sales Co. has been formed here to take over the distribution of the Dolly Madison car manufactured by the Madison Motors Co., Anderson, Ind.

Retlaw Sales Co. Formed

DETROIT, MICH., Aug. 2—The Retlaw Sales Co. has been organized with offices at 1120 Dime Savings Bank Building, to act as distributor for the Retlaw Mfg. Co., manufacturer of gasoline and oil

gages and special gasoline gages for Ford cars. Frank J. Burrows, who was purchasing agent for the Briggs Detroit Co. and F. W. Marschner are interested in the sales company.

More Territory for Haynes Distributor

ST. LOUIS, Mo., July 31—All of Arkansas and part of Kentucky have been added to the territory in which the Newell Motor Car Co. of St. Louis represents the Haynes factory. The local company already has the agency for Missouri and southern Illinois.

President James E. Newell says he will establish a branch at Little Rock, Ark., soon and will put several additional salesmen on the road.

To Distribute Reo in Nevada

RENO, NEV., July 31—The Durham Sales Co. was organized July 10 with a

capital of \$25,000 with the following officers. C. W. Mapes, president, J. C. Durham, vice-president and general manager, T. R. Gibson, secretary, Washoe County Bank, treasurer. The Durham Sales Co., Inc., is direct factory distributors for Reo cars and trucks in Nevada, Mono, Alpine, Plumas, Sierra, Nevada, Lassen and Modoc Counties in California and Klamath and Lake Counties in Oregon. A complete line of accessories and parts will be carried.

Pullman New York Agency Discontinued

NEW YORK CITY, Aug. 3—The Kent Motors Corp. has been formed to take over the Pullman Sales Co., 1704 Broadway, the Pullman agency having been discontinued. The Kent concern will handle the Abbott and Marion and will continue Pullman service work until other arrangements are made.

Fourteen Methods of Examining Motor Fuels

(Continued from page 249)

with the lower boiling point at 80 degrees lacks the volatile components which make the motor responsive to accelerations. The conception of an ideal motor gasoline should be revised in the way of modifying the demand for narrow boiling limits by insisting on light components, which means with boiling points 40 and 100 or 110 instead of 80 and 120 degrees.

When three gasolines of 80 and 90, 90 and 100 and 100 and 110 degree limits are mixed, there is obtained a fluid having about 25 per cent of components which do not boil till above 100 degrees and with a specific gravity of .740. Its period of evaporation is about 3 hours and its price 1.50 mark per kilogram. Despite its narrow boiling limits it is not an ideal motor gasoline.

In the proposed classification, the boiling limits for class A may be given as 40 and 125 degrees with not more than 10 per cent distilling above 100 degrees C.

For class B the limits may be 45 and 140, with at most 25 to 30 per cent above the 100-degree boiling point, and for class C 65 degrees lower limit, 150 to 170 degrees upper limit, with not more than 75 to 80 per cent above the 100-degree limit.

13. Refractometer Test

Petroleum is optically active. Oils of resin, fats, turpentine, gasolines and benzols can be distinguished from each other by spectral observation with a refractometer. The use of this means for testing motor fuels has been theoretically considered before, but was never applied in practice.

In the present series of examinations it was found that only the large Zeiss-Pulfrich refractometer could be used successfully for determining the refractometer degree. The prism employed was one indexed Ia ND 1,62100, and the readings taken of the refractometer degree were recorded without converting them into the corresponding angles of refraction, as the differences in this manner become more pronounced.

The refractometer degree at a temperature of 20 degrees C. is determined, in each instance, by leaving the fluid to be examined for several hours in the room where the test is to be made, so that both the instrument and the research material will acquire the temperature mentioned, which is maintained in the room. It is recommendable to cover the

container of the test fluid with a glass lid during the process of examination to avoid evaporation which, in the case of light gasolines, causes blurring of the boundary line and leads to inaccurate reading of the refractometer degree.

This degree varies for motor gasolines from 50 to 59 and is highest for the most perfect fuel. Class A should have a refractometer degree not lower than 54, class B not below 53 and class C at least 50.

Benzols have a much lower refractometer degree, varying from 37 to 38. But a crude lighting benzol cannot be distinguished from a pure motor benzol by means of the refraction of light, while different gasolines can be classified by this method, without rendering fractional distillation superfluous, however. The refractometer degrees of toluols are slightly higher than those of benzols, and those of xylools still higher. A benzol with strong aromatic components will therefore register a little higher by this measure than motor benzol.

Motor alcohol shows a refractometer degree of 58 to 59, and the test can therefore be used to advantage for proving an admixture of alcohol to benzol.

As pentane shows the highest (59° 30') and heptane (53° 49') and olefines low refractometer degrees, good and light gasolines contain more pentanes and other grades more hexane and heptane.

Among the fractional components of gasolines those boiling above 100 degrees C. show the lowest refractometer degree and those boiling below 100 degrees the highest, while that of the gasoline as each lies in the middle. With benzols the opposite is the case, the heavier components having the highest refractometer degree. [Dr. Dieterich here furnishes a list of the refractometer degrees for a scale of fuel mixtures produced synthetically by mixing normal gasoline with pure benzol in different proportions; also for the isolated fractional components.]

It is noted that the refractometer degree for a mixture of gasoline and benzol in equal parts drops to 48, and the test can therefore be considered of practical utility, being in itself simple and quickly made.

Test No. 14 relates to prices, which of course should be in harmony with the properties revealed by the other 13 tests and with the classified specifications listed in the previous instalment.

Factory Miscellany

Foster Gear Plant Rushed—J. B. Foster, secretary-treasurer of the Foster Gear Co., Columbus, Ohio, says orders for steering gears are being received so fast that it is a difficult matter to keep up deliveries. The company now has about sixty-five men on its payrolls and plans are being made for an addition to the plant. An order for 18,000 sets of steering gears has been received recently and there are orders for about 25,000 more in prospect.

Hess-Pontiac Works Busy—The Hess-Pontiac Spring & Axle Works, Pontiac, Mich., are taking on as many men as they are able to get in anticipation of the busiest year they ever had. This concern's output is largely taken by the Ford Motor Co. For quite a while efforts have been made to get skilled labor and it is said that the factory managers are paying the moving expenses of families coming from far distant localities.

Pierce-Arrow Storehouse—Erection is well under way in Buffalo, N. Y., of a new warehouse for the Pierce-Arrow Motor Car Co. The building will be four stories without basement, and measures 453 by 61½ ft. Construction is reinforced concrete with mushroom floors, the spans being 20½ ft. The lower floor, which is of wooden blocks on concrete base, is located directly on the ground. A covered platform alongside, at the height of the sills of railroad cars, is fitted for the receipt and shipping of motor truck parts, the transfer between the platform and building

being by means of three short-lift elevators. The upper floors are finished with granolithic top. The building has steel sash with wire glass. Steam heating will be used—a departure from the blower system in use elsewhere in the plant.

Seek Skilled Labor—The Detroit Pressed Steel Co., Detroit, Mich., last week attempted to fill its urgent requirements for skilled labor by sending a representative to Milwaukee, where the newspapers were liberally patronized for "want ads." So many positions are open in Milwaukee, however, that the company met with little success. The free employment office operated in Milwaukee by the Wisconsin Industrial Commission is unable to fill all the calls for skilled help that are sent in by Milwaukee and southern Wisconsin manufacturers, particularly in the motor car trade. The Mitchell-Lewis Motor Co., Racine, Wis., sent a hurry call to the bureau last week for fifty machine hands, but was able to get only half that number. The Racine company at the same time left a standing order for all the experienced motor car factory help that could be procured, and men are being sent to Racine as rapidly as they present themselves. The situation is considered unprecedented, for not in many months has there been even a semblance of an urgent demand for skilled labor.

New Chevrolet Plant—Ground was broken recently on the new plant of the Chevrolet Motor Co., Detroit, Mich. This plant will be used for the manufacture

of motors and will employ 1100 mechanics. The building, 616 by 150 ft., one-story, with 2½ acres of floor space, will be ready for operation by Sept. 15.

With a view to being prepared for further expansion, the company within the last three weeks has acquired property on both sides of the Flint River, in the Fourth and Fifth wards sufficient to care for all future development.

The new property acquired includes about a dozen residence buildings that must be removed, some of them where the first new structure will be built just west of the Mason Motor Co., one of the Durant companies, which was acquired by the Chevrolet company recently, and while it will continue to be conducted as a separate institution with a separate organization, its function will be to build all of the motors for the Chevrolet plants in Flint, New York City and Tarrytown. With the new building the production will be increased to 1000 motors a day.

The Mason plant is working night and day shifts with a force varying from 700 to 750. With the completion of the new building the day force will probably be increased to about 1500.

Gray & Davis Employee's Outing—Some 2000 employees of Gray & Davis, Inc., Boston, Mass., together with their families, attended the annual field day at Wakefield July 31. Field sports, ball game, tug-of-war, water races, etc., furnished interesting events in the program. It required forty-seven trolley cars to transport the operatives from Boston to the grounds.

The Automobile Calendar

Aug.....	Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.	Sept. 13-17.....	Oakland, Cal., Pan-American Road Congress.	Oct. 3-10.....	St. Louis, Mo., Show, Forest Park Highlands, St. Louis Automobile Manufacturers and Dealers' Assn.
Aug. 2-3.....	San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.	Sept. 17-18.....	Peoria, Ill., Illinois Garage Owners' Assn. Convention.	Oct. 6-16.....	New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.
Aug. 7.....	Des Moines, Ia., Speedway 300-Mile Race.	Sept. 18.....	Providence, R. I., 100-Mile Race, Narragansett Park Speedway, Inc.	Oct. 11-12.....	Dayton, O., National Paving Brick Manufacturers' Assn., Annual Meeting.
Aug. 7.....	Chicago, Ill., 100-Mile Match Race, Chicago Speedway.	Sept. 18-25.....	Los Angeles, Cal., Show, Shrine Auditorium.	Oct. 14.....	Chicago, S. A. E. Standards Committee Meeting.
Aug. 7.....	Rockford, Ill., Hillclimb, Rockford Motor Club.	Sept. 20-25.....	San Francisco, Cal., International Engineering Congress.	Oct. 16.....	Chicago, Ill., 350-Mile Race, Chicago Speedway.
Aug. 20-21.....	Elgin, Ill., Road Races.	Sept. 24.....	Indianapolis, Ind., S. A. E. First Section Meeting.	Oct. 18-19.....	Cleveland, O., Hotel Statler, Sixth Annual Convention, Electric Vehicle Assn. of America.
Aug. 30.....	Columbus, O., Show, Ohio State Fair, Columbus Auto. Show Co.	Sept. 27-Oct. 10.....	Denver, Col., Show, International Soil Products Exposition, Automobile Trades Assn. of Colorado.	Nov. 1-3.....	Pasadena, Cal., Show, Hotel Green, Walter Hensel.
Sept.....	Peoria, Ill., Second Northwestern Road Congress.	Oct.....	Dallas, Tex., Show, Dallas Automobile Dealers' Assn.	Nov. 18.....	Arizona 150-mile Grand Prix.
Sept. 4.....	Twin City, Minn., 500-Mile Race; Twin City Motor Speedway Co.	Oct.....	Los Angeles, Cal., Broadway Automobile and Flower Show, Automobile Dealers' Assn.	Nov. 29-Dec. 4.....	Electric Prosperity Week.
Sept. 6-10.....	Indianapolis, Ind., Show, Indiana State Fair.	Oct. 1-2.....	Trenton, N. J., Track Races: Inter-State Fair.	Dec. 31.....	New York City, Show; Grand Central Palace.
Sept. 6-15.....	Detroit, Mich., Show, Michigan State Fair.	Oct. 2.....	New York City, Sheephead Bay Motor Speedway Track Meet.	Jan. 22, 1916.....	Chicago, Ill., Show; Coliseum.
Sept. 8-11.....	Hamline, Minn., 2-Day Meet at State Fair Grounds between Minneapolis and St. Paul, State Fair.	Oct. 2-9.....	Cincinnati, Ohio, Show, Music Hall, Cincinnati Automobile Dealers' Assn.	March 4-11.....	Boston, Mass., Truck Show, Mechanics Bldg.

The Week in the Industry



Buckbee with Ahlberg—George A. Buckbee has been made manager of the Boston branch of the Ahlberg Bearing Co., Chicago.

O'Rourke Purchasing Agent—J. S. O'Rourke has been appointed purchasing agent of the Oakland Motor Car Co., Pontiac, Mich., succeeding H. R. Vinot, resigned.

Garage

New Fox Lake Garage—Albert Paulson has established a garage and repair shop at Fox Lake, Wis., occupying the Fox Lake Garage.

A \$20,000 Garage—A large garage costing about \$20,000 is being erected on Lisbon Avenue, near Thirty-first Street, Milwaukee, Wis., by Graf Bros.

Lakeside Garage Opened—C. H. Wilkenson has opened a garage and repair shop in Lakeside, Mich. His specialty is to take care of repairs on Ford and Overland cars.

\$22,000 Garage Fire—Fire caused a \$22,000 loss in Anniston, Ala., when the brick garage owned by Joseph Saks was destroyed together with automobiles valued at \$10,000.

Fifty-Truck Garage—L. O. Stewart & Bros., coal, wood and ice merchants of Washington, D. C., are planning a garage to accommodate fifty trucks. The structure will have 20,000 sq. ft. floor space and its cost will be \$10,000.

Enter Garage Field—W. D. Johnson, Lancaster, Wis., and R. J. Hoover, Sauk Prairie, Wis., have formed a partnership and will engage in the garage and repair business at Lancaster. The firm has plans for a \$5,000 garage building 60 by 132 ft.

Recent Wisconsin Garage Happenings—W. W. Osborn has opened a garage and repair shop in the Stroebel warehouse building on Main Street, Neenah, Wis. Hunt & Machia, operating the Sawyer Garage at Sturgeon Bay, are now located in their new fireproof garage, erected on the site of the building destroyed by fire on Sept. 13, 1914. The Western Iron Stores Co., Milwaukee, one of the largest wholesale and retail dealers in mechanics' tools, machinists', mill and shop supplies, has moved to new and larger quarters at 145-147 West Water Street, one block south of Grand Avenue. The Main Auto Co., Appleton, has purchased the stock, equipment and business of the Griffin Auto Co., Appleton.

Motor Men in New Roles

Bertman Succeeds McManus—A. W. Bertman has succeeded E. E. McManus as advertising representative for the St. Louis, Mo., branch of the Firestone Tire & Rubber Co.

Kenney in St. Louis—F. C. Kenney, who has been managing the Memphis, Tenn., Studebaker branch, has returned to St. Louis, resuming his former position of assistant manager at that branch.

Hopkins Goes to Providence—E. C. Hopkins, formerly identified with the Boston branch of the Buick Co., has gone to Providence to become manager of the Buick agency in Rhode Island controlled by Charles F. Thatcher.

Gets National Tire—The Barnhouse-Hemmerly Auto Co. has secured the agency in Marion, Ohio, for the National tire.

Arnold Branches Out—The Arnold Auto Co., Wichita, Kan., will establish a branch house at Hutchinson. The concern handles the Chalmers.

Studebaker in Oklahoma City—A wholesale Studebaker branch has been opened in Oklahoma City under the management of Iver Schmidt.

Bimel Indiana Headquarters—The Bimel Buggy Co., Sidney, Ohio, maker of the Elco "30," has established State headquarters in Indianapolis, Ind. A. C. Nobes, president of the Sidney concern, is in charge.

Move to New Quarters—The salesrooms of the Paige Detroit and the Saxon in Boston, Mass., have been moved into a new building just finished at 595 Newbury Street. Both companies will have ample quarters for salesrooms and service stations.

Installs New Furnace—The Wisconsin Welding & Cutting Co., Milwaukee, Wis., is installing considerable new equipment, including a furnace costing \$1,500. The shop is now equipped to weld aluminum, this department being in charge of Gustave Johnson, an expert in this line. C. H. Hansen is general manager.

Welding and Cutting Shop—A welding and cutting shop that makes a specialty of motor car work has been established at Green Bay, Wis., by Walter F. Gerald, formerly associated with the Universal Oxygen Co., Sheboygan, Wis. The new shop is known as the Badger Welding & Cutting Co., and is located at 127 South Barclay Street.

Ogg Detroit Electric Mgr.—Basil Ogg, former president of the Springfield Auto Sales Co., Springfield, Ill., has been appointed manager of the branch house to be established by the Anderson Electric Car Co. of Detroit, and which will open for business at 218-222 South Fourth Street, Springfield. Mr. Ogg will devote his entire time to this firm.

Dealer

Opens in Louisville—The Paige Motor Sales Co., which secured the Paige agency in the Louisville territory Aug. 1, has opened an office and salesroom at 725-729 South Fourth Street, Louisville, Ky., formerly occupied by the Kentucky Motor Car Co. Edward A. Briel is president and manager of the new concern.

Peck in New Quarters—The Peck Auto Sales Co., Studebaker distributor in the Grand Rapids (Mich.) territory, has completed and moved into its new service station repairshop. The building is concrete and brick construction. The present quarters of the company across the street will be devoted to sales and office purposes.

Shop and Service Station—The Hudson-Brace Motor Co., handling the Hudson in Kansas City, Mo., is building a shop and service station 50 by 112½ ft. on Oak Street, in the rear of their present salesrooms. The present quarters where the shop is now located will then be used for salesrooms, second-hand cars and cars in process of delivery.

Judd Takes Over Business—John L. Judd, who has been traveling representative for the E. A. Gilmore Co., Boston, Mass., New England distributor for the Lewis VI and the Allen cars, has taken over the business and he will continue it at the present salesrooms, 92 Massachusetts Avenue. Mr. Gilmore has retired from the business entirely and he may go to Worcester to handle the Dodge.

Opens in Kansas City—The Bush-Morgan Motor Co. opened for business Aug. 2 at 1526 Grand Avenue, Kansas City, Mo., as agents for the Paige car. They have a well-equipped repair shop and service station, handsome offices and commodious salesrooms. Mr. Roy R. Bush was formerly well known in the farm implement field when with the Kingman-Moore Co.; later he was with the Velie Co. at Moline. Mr. W. H. Morgan has been associated with Mr. Bush for many years.

THE AUTOMOBILE

August 5, 1915

Birmingham Co. Moves—The Turner Electric Supply Co., Birmingham, Ala., has moved to 2104 First Avenue.

Buys Supply Co.—The Austin Tire & Supply Co., with C. L. Pate manager, has purchased the business of the Aber-Schultz Auto Co. at Austin, Tex.

New Dallas Velvet Co.—D. L. Ormsby, distributor of Velvet shock absorbers for the State of Texas, has sold his State rights to the M. & S. Sales Co., Dallas, Tex.

New Los Angeles Garage—R. Starkweather has opened a general repair shop at 726 West Pico Street, Los Angeles, Cal., to be known as the Imperial Garage.

Packard Electric in Detroit—The Packard Electric Co., Warren, Ohio, has opened a branch office in the David Whitney Building, Detroit, Mich. W. L. Marsh is in charge.

Madison Opens in Louisville—The Madison Co., which recently acquired the agency for the Madison, has opened an office and salesroom at 206-210 East Broadway, Louisville, Ky.

New Garage for Shawano—The F. H. Gruetzmacher Automobile Co., Shawano, Wis., organized recently, is erecting a large garage. The building will contain a complete machine shop and welding plant.

Headquarters at Dallas—The Giant Tire & Rubber Co., Omaha, Neb., has obtained a permit from the Secretary of State of Texas to do business in that State. Its Texas headquarters will be at Dallas.

Toledo Co. to Move—The Browne Supply Co., Toledo, Ohio, has taken a lease of the corner at Jefferson and Erie Streets and will occupy it about July 15. The company will have practically double the space it now occupies.

New Tire Store—The Louisville Tire Co. has moved into its new tire and accessory store at 666 South Third Street, Louisville, Ky. The company handles Dayton airless and pneumatic tires. F. W. Weisenberger is the manager.

Noxal Co. Makes Change—The Noxal Co. is giving up its sales office at 1400-1402 Michigan Ave., Chicago, Ill., and is combining its sales office with the executive and manufacturing offices at 29 South Clinton Street, change taking place Aug. 1.

Hartford Dealer Moves—Kingsley & Wetherell, Inc., Hartford, Conn., representatives of the Moon and King, have leased the store at 11 Main Street for a salesroom and will occupy it in the near future. The service station at 59 Congress Street will be retained.

Open New Oil Station—Austin, Bryant & Carter, distributors of A B C oils, will shortly open a distributing station in San Francisco which will supply the

trade of all of northern California, including Stockton and Sacramento.

Auto Supply Opens in Seattle—Barsby & Neep Auto Supply Co. opened in Seattle, Wash., recently, and will act as distributors of Master carburetors in the King County territory, besides which they will handle Marathon tires and the complete Johnsville line of accessories.

New Velie Distributors—A. W. and M. J. La Roche have been appointed eastern distributors of the Velie Motor Vehicle Company of Moline, Ill., under the firm name of La Roche Brothers. Salesrooms have been secured at 506-508 North Broad Street, Philadelphia, Pa.

Oakland Company Organized—The Oakland Motor Co. has been organized at Austin, Tex., and it has been appointed distributor for the Oakland in that territory. H. H. Cullen and F. E. Pryor are managers. The company has opened rooms at 300 East Fifth Street.

Places Big Ball Order—The Los Angeles branch of the Ahlberg Steel Bearing Co. has placed an order for 100,000 steel balls, which is only the beginning for the Los Angeles house. The stock inventory shows 150,000 on hand. The branch will keep stock on hand to supply the service stations of twelve states.

New Midgley Tire Agencies—The following firms have taken on Midgley tires: Peterson-Keyes Automobile Co., 401 North Capital Avenue, Indianapolis; Motor Tire & Repair Co., 1817 Grand Avenue, Kansas City; Athena Tire Co., Chicago, Ill.; Kleyn Automobile Co., Duluth, Minn., and Peters & Sons, Ltd., London.

Milwaukee Garage to Add—The Sanger Automobile Co., 564-574 Farwell Avenue, Milwaukee, Wis., operating one of the largest garages in Milwaukee, and representing the Franklin, is preparing to double the size of the garage by the addition of a full second floor, 50 by 130 ft. The first floor will be remodeled and equipped with electric freight elevators, steel shutter rolling doors, etc.

Babcock in New Shop—The Babcock Automobile Spring Co., Milwaukee, Wis., has taken occupancy of its new factory and store building at 192-194 Milwaukee Street. The company devotes its attention exclusively to replacement of automobile springs and expert repairing, which includes re-arching and re-tempering. The company is Wisconsin distributor for the Tuthill-Titanic spring.

Recent King Changes—Reason & Ross, King dealers in Cincinnati have changed firm name to the King Motor Sales Co. The Bowman Sales Co., King dealer, has changed its location from McKean, Pa., to Erie, Pa., where it was located at 18-24 West Fifth Street. Barnhart & Danner, King distributors at Salt Lake City, Utah, have moved into a new establishment at Fourth South and West Temple Streets, and will operate under the name of Lincoln Garage.

Hyatt Roller's New Bldg.—Excavating is well under way for the new office building of the Hyatt Roller Bearing Co. at Cass Avenue and West Grand Boulevard, Detroit, Mich. The building will be the home of the sales and engineering departments of the automobile division of the Hyatt Company. It is to be three stories high and its exterior will be of rough red brick with fine stone trimmings and cornices.

Recent Braender Tire Changes—The Braender Rubber & Tire Co. advise that Ketcham & Lawrie of Newark are no longer their agents in the State of New Jersey. They have appointed the O. A. R. Motor Car Co., 915 South Avenue, Plainfield, N. J., to represent them in that territory. The Tire Shop, 1926 North Charles Street, is no longer representing the Braender Rubber & Tire Co. in Baltimore, but the McGraw Tire Co., Inc., 10 West Oliver Street, Baltimore, has taken the agency for the Braender products for the entire State of Maryland.

St. Louis Cos. Extend—The Park Automobile Co., St. Louis, Mo., agent for the Chalmers line, has been given additional territory in three states. The new selling territory of the Park company includes twenty-seven counties in Missouri, thirty in Illinois and seven in Kentucky. The Park company will appoint sub-agents in the larger towns of the new territory in the near future. The Weber Implement Co., distributor of Hupmobile and Mitchell cars, has opened a news salesroom for used cars at the northwest corner of Eighteenth and Pine Streets. The building is two stories high and covers a lot of 100 by 109 ft.

Louisville Trade Happenings—The Empire Auto Sales Co., agent for the Empire, has moved its quarters from 437 South Second Street to 624 South Third Street, Louisville, Ky. The Louisville Automobile Exchange, 544 South Third Street, has secured the agency for the Mitchell. Kentucky Motor Car Co., Cincinnati, Ohio, formerly agent for the Oakland in the Louisville territory, has discontinued its Louisville office, located at 725 South Third Street. The Hyatt Auto Repair Co. has opened a repair shop at 211 York Street. The Hanna Gibson Co., 206 East Broadway, has acquired the agency for the Madison Six. The Quick Tire Service Co., Third Street and Broadway, has been appointed Louisville distributor for the United States Tire Co. The Central Garage has opened an accessory store and automobile repair shop at 437 South Second Street. J. J. Gaffney is president of the concern. The Callahan Motors Co., agent for the Chandler, has acquired the Louisville agency for the Scripps-Booth.